OM-193 267R

2007–10

Processes

MIG (GMAW) and Pulsed MIG (GMAW-P) Welding

Flux Cored (FCAW) Welding

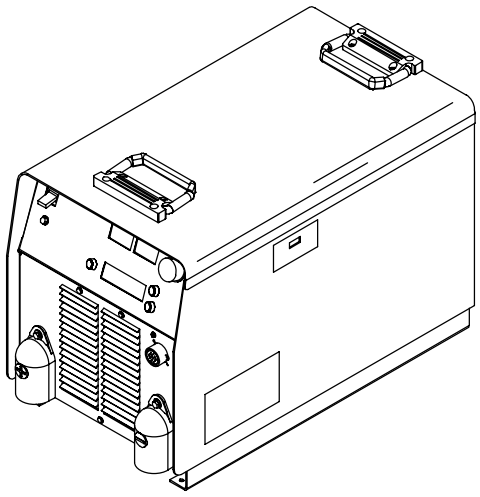
Stick (SMAW) Welding

Description

3 Phase DC CC CV

Invision® 456MP

(230/460 And 575 Volt Models)



OWNER'S MANUAL

File: MIG (GMAW)

Visit our website at

www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.

ISO 9001:2000 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

Protect yourself and others from injury — read and follow these precautions.

1-1. Symbol Usage

DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE *– Indicates statements not related to personal injury.*

☞ *Indicates special instructions.*

This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children, away.

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists in inverter-type welding power sources after removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

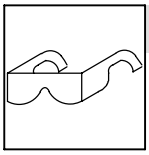
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



FLYING METAL or DIRT can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

MAGNETIC FIELDS can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

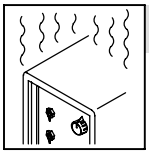
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

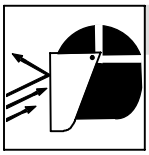
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



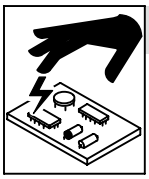
OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

MOVING PARTS can cause injury.

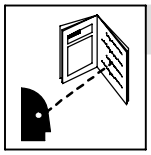
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

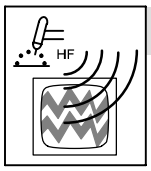
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine replacement parts from the manufacturer.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings

Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

For Gasoline Engines:

Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

For Diesel Engines:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www. sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (phone: 703-788-2700, website:www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Mississauga, Ontario, Canada L4W 5NS (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036–8002 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org.

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

1-6. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

Se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.

2-1. Symboles utilisés

DANGER! – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

***NOTE** – Indique des déclarations pas en relation avec des blessures personnelles.*

☞ *Indique des instructions spécifiques.*

Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

2-2. Dangers relatifs au soudage à l'arc

Les symboles représentés ci-dessous sont utilisés dans ce manuel pour attirer l'attention et identifier les dangers possibles. En présence de l'un de ces symboles, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les instructions en matière de sécurité indiquées ci-dessous ne constituent qu'un sommaire des instructions de sécurité plus complètes fournies dans les normes de sécurité énumérées dans la Section 2-5. Lire et observer toutes les normes de sécurité.

Seul un personnel qualifié est autorisé à installer, faire fonctionner, entretenir et réparer cet appareil.

Pendant le fonctionnement, maintenir à distance toutes les personnes, notamment les enfants de l'appareil.

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le contact d'organes électriques sous tension peut provoquer des accidents mortels ou des brûlures graves. Le circuit de l'électrode et de la pièce est sous tension lorsque le courant est délivré à la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur Marche. Dans le mode de soudage avec du fil, le fil, le dérouleur, le bloc de commande du rouleau et toutes les parties métalliques en contact avec le fil sont sous tension électrique. Un équipement installé ou mis à la terre de manière incorrecte ou impropre constitue un danger.

- Ne pas toucher aux pièces électriques sous tension.
- Porter des gants isolants et des vêtements de protection secs et sans trous.
- S'isoler de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; ou s'il y a un risque élevé de contact inévitable ou accidentel avec la pièce à souder ou le sol. Dans ces conditions, utiliser les équipements suivants, dans l'ordre indiqué : 1) un poste à souder DC à tension constante (à fil), 2) un poste à souder DC manuel (électrode) ou 3) un poste à souder AC à tension à vide réduite. Dans la plupart des situations, l'utilisation d'un poste à souder DC à fil à tension constante est recommandée. En outre, ne pas travailler seul !
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer le poste correctement et le mettre à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.
- Toujours vérifier la terre du cordon d'alimentation. Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez–les contre les étincelles et les pièces métalliques chaudes.
- Vérifier fréquemment le cordon d'alimentation afin de s'assurer qu'il n'est pas altéré ou à nu, le remplacer immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité si l'on doit travailler au-dessus du sol.
- S'assurer que tous les panneaux et couvercles sont correctement en place.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.
- Ne pas raccorder plus d'une électrode ou plus d'un câble de masse à une même borne de sortie de soudage.

Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur quand on a coupé l'alimentation.

- Arrêter les convertisseurs, débrancher le courant électrique et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie Entretien avant de toucher les pièces.

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

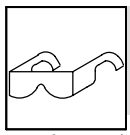
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage approuvé muni de verres filtrants approprié pour protéger visage et yeux pendant le soudage (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Ne soudez pas si l'air ambiant est chargé de particules, gaz, ou vapeurs inflammables (vapeur d'essence, par exemple).
- Brancher le câble de masse sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Une fois le travail achevé, assurez–vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe–circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Une fois le travail achevé, assurez–vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe–circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



DES PIECES DE METAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non-utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

LES CHAMPS MAGNETIQUES peuvent affecter des implants médicaux.

- Porteur de simulateur cardiaque ou autre implants médicaux, rester à distance.
- Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction.

LE BRUIT peut endommager l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvées pour les oreilles si le niveau sonore est trop élevé.

LES BOUTEILLES peuvent exploser si elles sont endommagées.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique ; les maintenir ainsi que les éléments associés en bon état.
- Détourner votre visage du détendeur-régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque la bouteille est utilisée ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

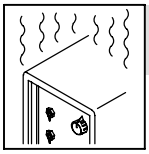
2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Ne pas installer l'appareil à proximité de produits inflammables.
- Ne pas surcharger l'installation électrique – s'assurer que l'alimentation est correctement dimensionnée et protégée avant de mettre l'appareil en service.

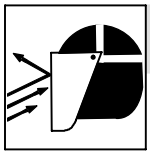
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



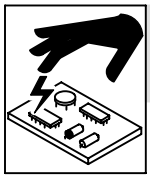
L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement ; respecter le cycle opératoire nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affûter l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manœuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.

DES ORGANES MOBILES peuvent provoquer des blessures.

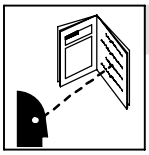
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

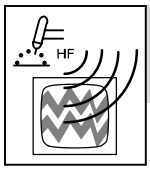
DES ORGANES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour l'entretien.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



LIRE LES INSTRUCTIONS.

- Lisez le manuel d'instructions avant l'utilisation ou la maintenance de l'appareil.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.

LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

2-4. Proposition californienne 65 Avertissements

⚠ **Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)**

⚠ **Les batteries, les bornes et autres accessoires contiennent du plomb et des composés à base de plomb, produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. Se laver les mains après manipulation.**

Pour les moteurs à essence :

⚠ **Les gaz d'échappement des moteurs contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.**

Pour les moteurs diesel :

⚠ **Les gaz d'échappement des moteurs diesel et certains de leurs composants sont reconnus par l'État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.**

2-5. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1 de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de National Fire Protection Association, P.O. Box 9101, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (téléphone : 703-788-2700, site Internet : www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, de Canadian Standards Association, 5060 Mississauga, Ontario, Canada L4W 5NS (téléphone : 800-463-6727 ou à Toronto 416-747-4044, site Internet : www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, de American National Standards Institute, 11 West 43rd Street, New York, NY 10036-8002 (téléphone : 212-642-4900, site Internet : www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (téléphone : 1-866-512-1800) (il y a 10 bureaux régionaux––le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-6. Information EMF

Considérations sur le soudage et les effets de basse fréquence et des champs magnétiques et électriques.

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu : « L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine ». Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Pour réduire les champs magnétiques sur le poste de travail, appliquer les procédures suivantes :

1. Garder les câbles ensemble, les torsader, les scotcher, ou les recouvrir d'une housse.
2. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.
4. Garder le poste de soudage et les câbles le plus loin possible de vous.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.

En ce qui concerne les implants médicaux :

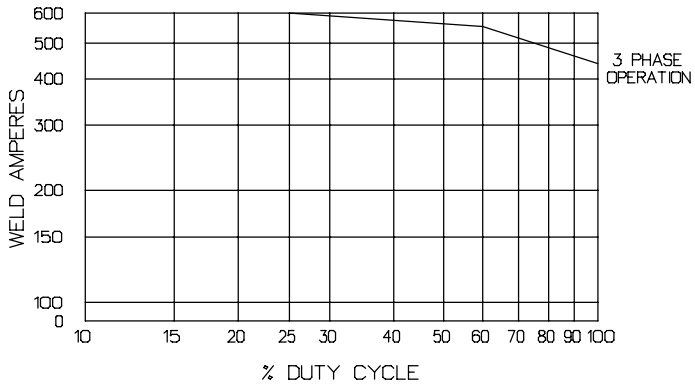
Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 – INSTALLATION

3-1. Specifications

Input Power	Rated Welding Output	Voltage Range	Maximum Open-Circuit Voltage DC	Amperes Input At Rated Load Output 60 Hz, Three-Phase			KVA		KW	
				230 V	460 V	575 V	230/460	575	230/460	575
Three Phase	450 A @ 38 Volts DC, 100% Duty Cycle; 565 A @ 43 Volts DC, 60% Duty Cycle	10 – 38	95	50.8 (0.14*)	27.8 (0.09*)	24.4 (0.12*)	21.2 (0.06*)	24.3 (0.12*)	19.2 (0.04*)	19.0 (0.07*)
*While idling										

3-2. Duty Cycle and Overheating

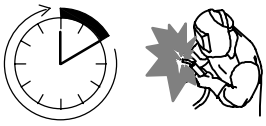


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

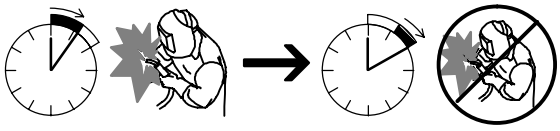
NOTICE *– Exceeding duty cycle can damage unit and void warranty.*

100% Duty Cycle At 450 Amperes



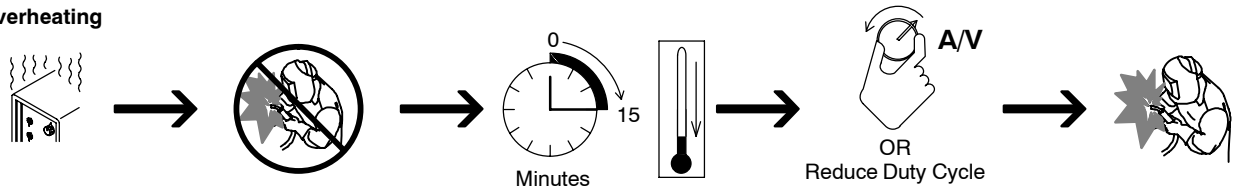
Continuous Welding

60% Duty Cycle At 565 Amperes



6 Minutes Welding — 4 Minutes Resting

Overheating

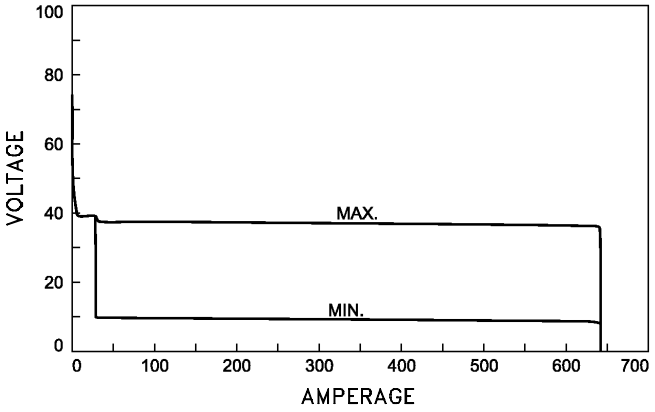


duty1 4/95 – SA-181 560

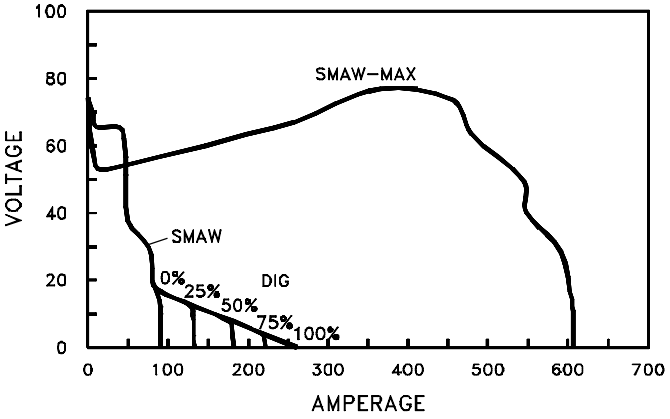
3-3. Volt-Ampere Curves

Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of unit. Curves of other settings fall between curves shown.

A. CV Mode



B. CC Mode



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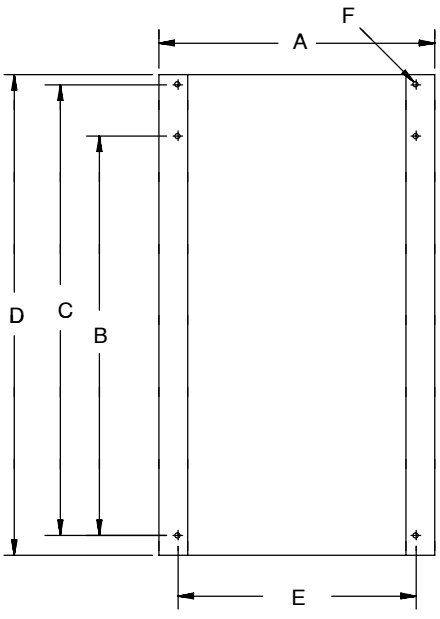
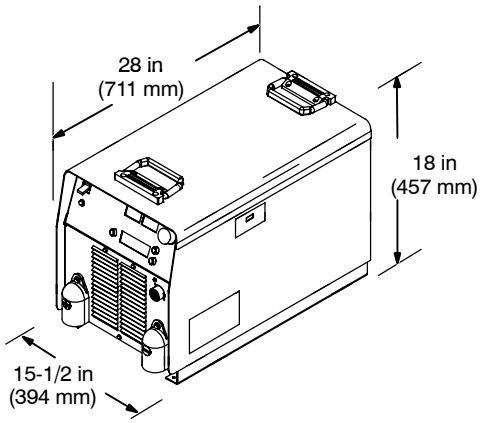
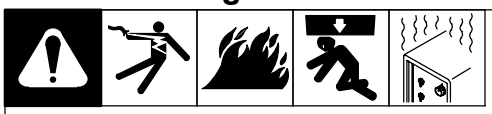
3-4. Dimensions and Weight

Hole Layout Dimensions	
A	14-21/64 in (363.9 mm)
B	20-3/4 in (527.1 mm)
C	23-27/64 in (594.9 mm)
D	24-31/32 in (634.2 mm)
E	12-3/8 in (314.3 mm)
F	9/32 in (7.1 mm) Dia.
Weight	
118 lb (53.5 kg)	

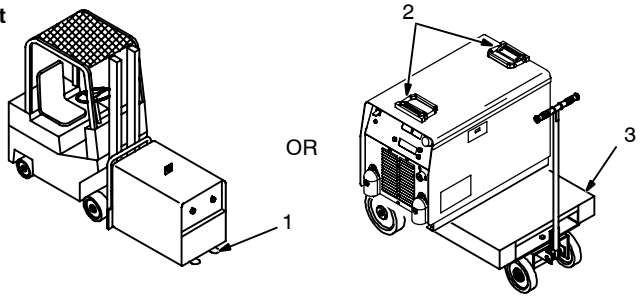




3-5. Selecting a Location

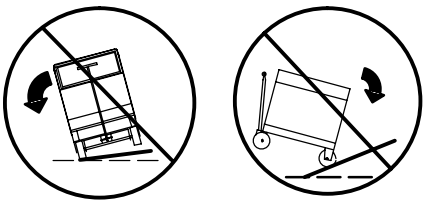


Movement

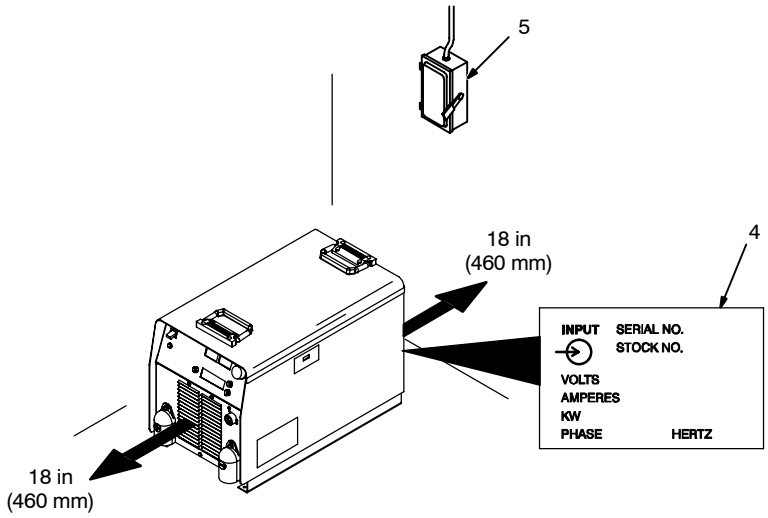


Tipping

Do not move or operate unit where it could tip.



Location



1 Lifting Forks

Use lifting forks to move unit.

Extend forks beyond opposite side of unit.

2 Lifting Handles

Use handles to lift unit.

3 Hand Cart

Use cart or similar device to move unit.

4 Rating Label

Use rating label to determine input power needs.

5 Line Disconnect Device

Locate unit near correct input power supply.

Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.

loc_2 3/96 - Ref. 151 556 / 800 611 / 802 314

3-6. Weld Output Terminals and Selecting Cable Sizes

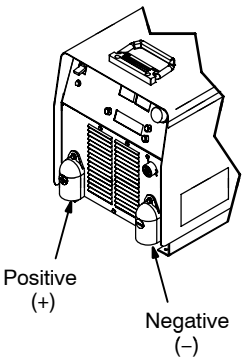
ARC WELDING can cause Electromagnetic Interference.

To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor. Locate welding operation 100 meters from any sensitive electronic equipment. Be sure this welding machine is installed and grounded according to this manual. If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

Weld Output Terminals

Turn off power before connecting to weld output terminals.

Do not use worn, damaged, undersized, or poorly spliced cables.



	Weld Cable Size and Total Cable (Copper) Length in Weld Circuit Not Exceeding***							
	100 ft (30 m) or Less		**150 ft (45 m)**	**200 ft (60 m)**	**250 ft (70 m)**	**300 ft (90 m)**	**350 ft (105 m)**	**400 ft (120 m)**
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)
400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	2 ea. 4/0 (2x120)
500	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 3/0 (3x95)
600	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 4/0 (3x120)	3 ea. 4/0 (3x120)

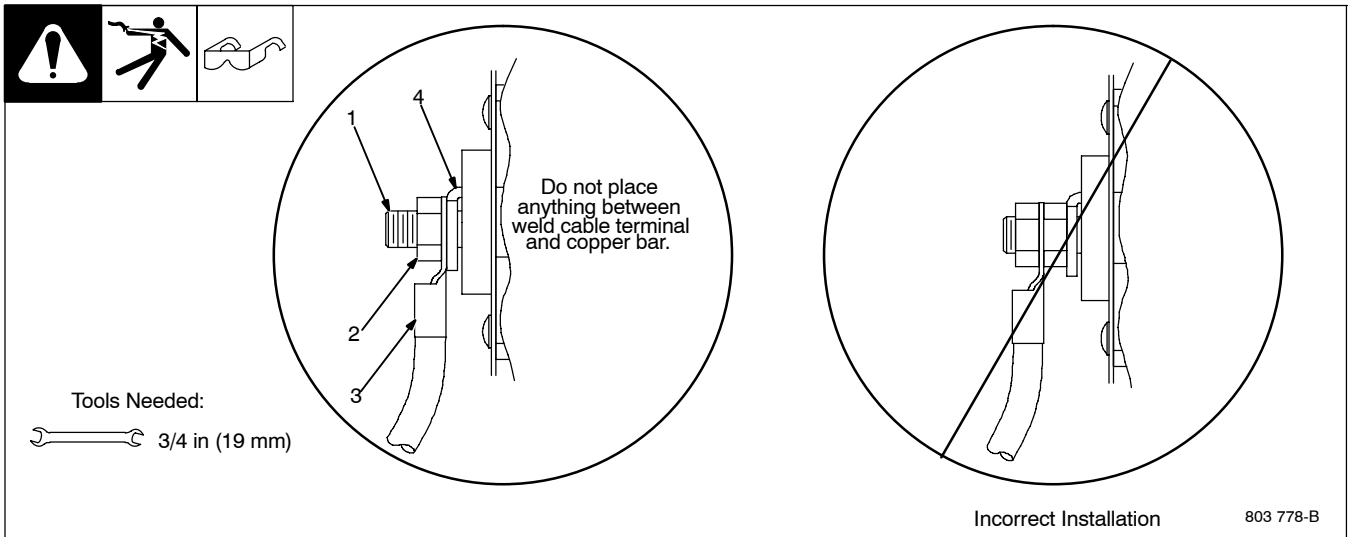
* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = mm^2 for metric use

S-0007-F–

***For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

3-7. Connecting Weld Output Cables



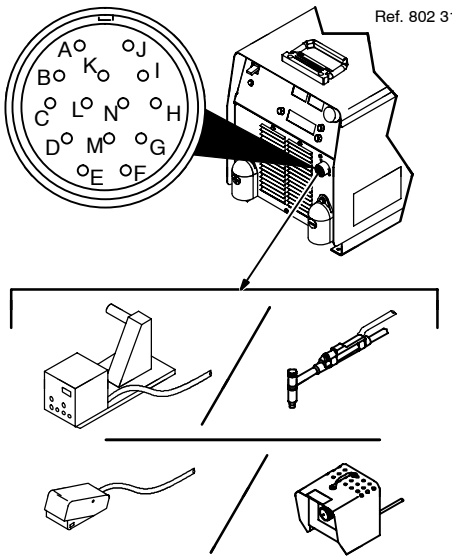
Turn off power before connecting to weld output terminals.

Failure to properly connect weld cables may cause excessive heat and start a fire, or damage your machine.

1 Weld Output Terminal
2 Supplied Weld Output Terminal Nut
3 Weld Cable Terminal
4 Copper Bar

Remove supplied nut from weld output terminal. Slide weld cable terminal onto weld output terminal and secure with nut so that weld cable terminal is tight against copper bar. **Do not place anything between weld cable terminal and copper bar. Make sure that the surfaces of the weld cable terminal and copper bar are clean.**

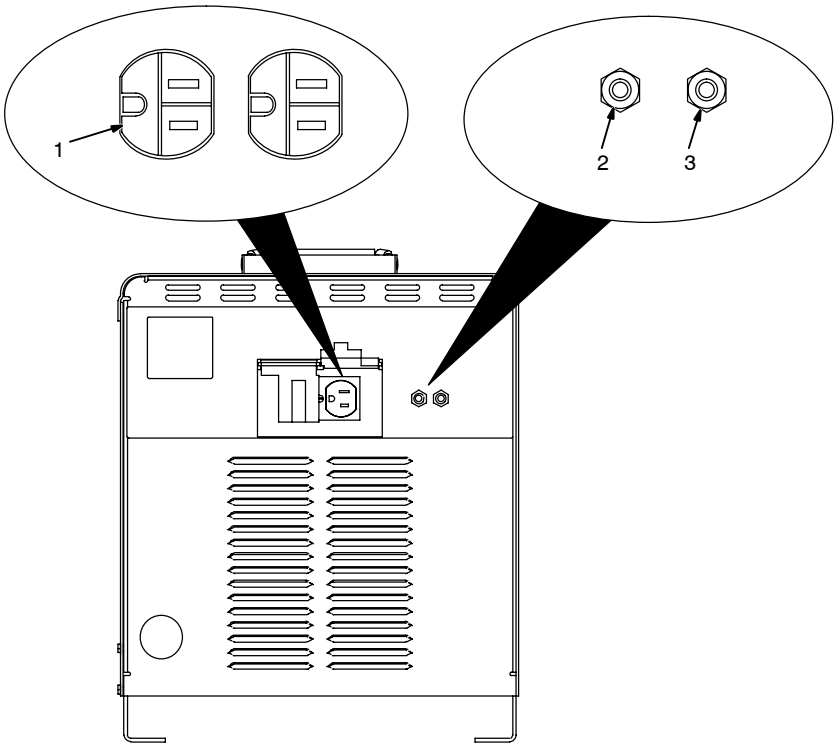
3-8. Remote 14 Receptacle Information



REMOTE 14	Socket*	Socket Information
24 VOLTS AC OUTPUT (CONTACTOR)	A	24 volts ac. Protected by circuit breaker CB2.
	B	Contact closure to A completes 24 volts ac contactor control circuit.
115 VOLTS AC OUTPUT (CONTACTOR)	I	115 volts ac. Protected by circuit breaker CB1.
	J	Contact closure to I completes 115 volts ac contactor control circuit.
REMOTE CONTROL	C	Output to remote control; +10 volts dc in MIG mode.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control.
	M	Mode select.
	N	Remote inductance control.
A/V AMPERAGE VOLTAGE	F	Current feedback; +1 volt dc per 100 amperes.
	H	Voltage feedback; +1 volt dc per 10 arc volts.
GND	G	Circuit common for 24 and 115 volts ac circuits.
	K	Chassis common.

*The remaining sockets are not used.

3-9. 115 Volts AC Duplex Receptacle and Circuit Breakers



1 115 V 10 A AC Receptacle

Power is shared between duplex receptacle and Remote 14 receptacle (see Section 3-8).

2 Circuit Breaker CB1

3 Circuit Breaker CB2

CB1 protects duplex receptacle and 115 volts ac portion of Remote 14 receptacle from overload.

CB2 protects 24 volts ac portion of Remote 14 receptacle from overload.

Press button to reset breaker.

ST-801 524-B

3-10. Electrical Service Guide

NOTICE *– INCORRECT INPUT POWER can damage this welding power source. This welding power source requires a CONTINUOUS supply of input power at rated frequency(±10%) and voltage (±10%). Phase to ground voltage shall not exceed +10% of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this welding power source.*

NOTICE *– Actual input voltage should not be 10% less than minimum and/or 10% more than maximum input voltages listed in table. If actual input voltage is outside this range, output may not be be available.*

Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated branch circuit sized for the rated output and duty cycle of the welding power source.

	60 Hz Three Phase		
Input Voltage	230	460	575
Input Amperes At Rated Output	53	27	24
Max Recommended Standard Fuse Rating In Amperes [1]			
Time-Delay [2]	60	30	30
Normal Operating [3]	80	40	35
Min Input Conductor Size In AWG [4]	8	10	12
Max Recommended Input Conductor Length In Feet (Meters)	102 (31)	269 (82)	254 (77)
Min Grounding Conductor Size In AWG [4]	8	10	12

Reference: 2005 National Electrical Code (NEC) (including article 630)

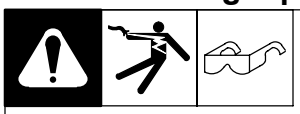
1 Consult factory for circuit breaker applications.

2 “Time-Delay” fuses are UL class “RK5” .

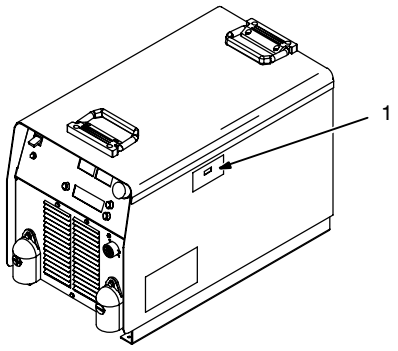
3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

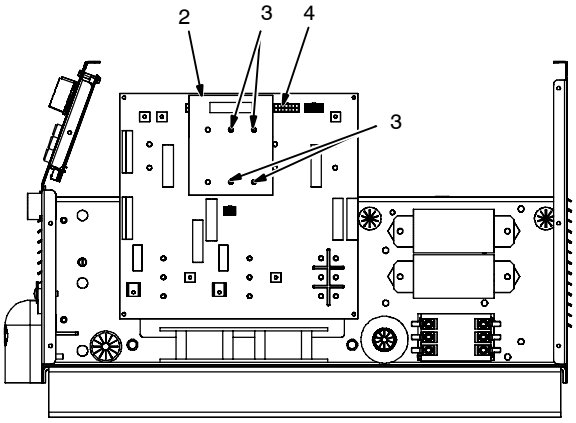
4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

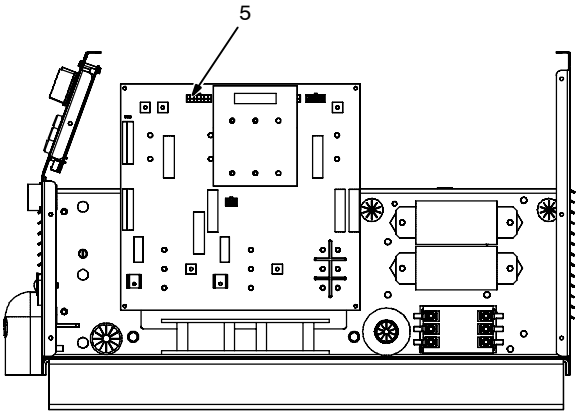
3-11. Selecting Input Voltage



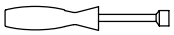
☞ *Be sure to reinstall all four screws securing relinking board in place.*







Tools Needed:



5/16 in

⚠ **Turn Off welding power source, disconnect input power, and check voltage on input capacitors according to Section 6-3 before proceeding.**

Check input voltage available at site.

1 Voltage Selection View Window

Check voltage selected in unit. Changing selection is only necessary if selected value does not match available input voltage.

2 Relinking Board PC6

3 Mounting Screws

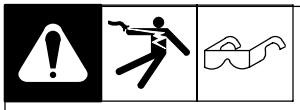
4 Receptacle RC8 (Connection For 230 VAC Input Power)

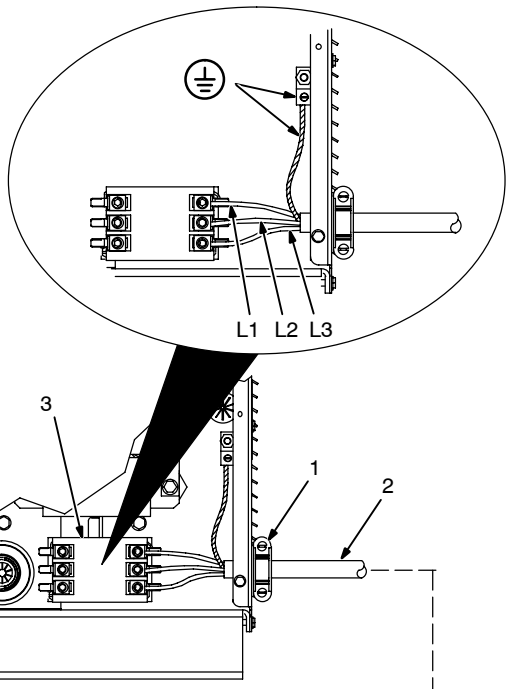
5 Receptacle RC7 (Connection For 460 VAC Input Power)

Move relinking board as needed and connect plug PLG4 (in unit) to RC8 or RC7 according to input power voltage.

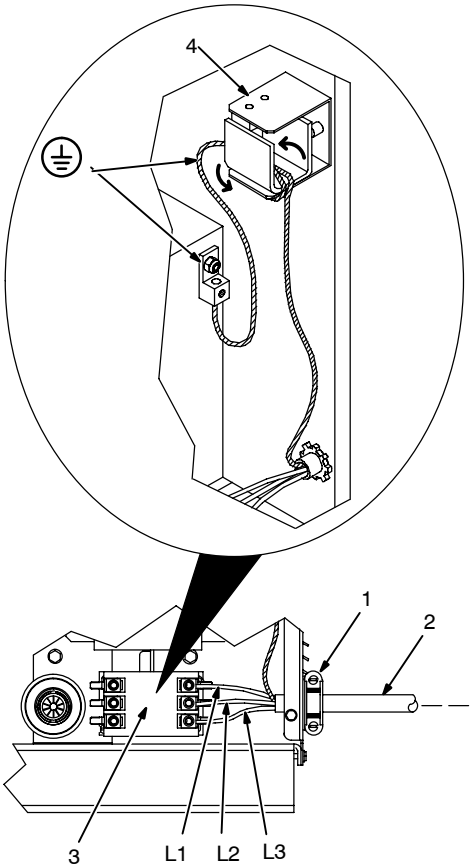
802 314 / 802 315

3-12. Connecting Input Power

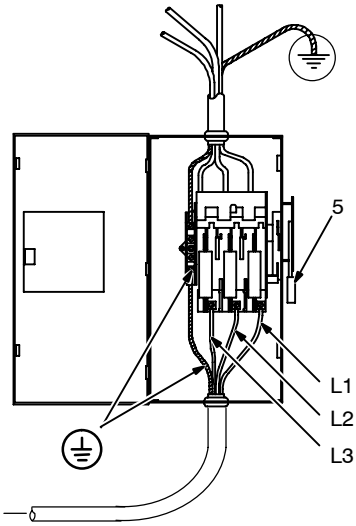




Connections For Standard Model



Connections For Models With Optional Ground Current Sensor



Or

= **GND/PE**

Always connect grounding conductor first.

Turn Off welding power source, and check voltage on input capacitors according to Section 6-3 before proceeding.

1 Strain Relief Connector Clamp

Obtain and install proper connector.

2 Input And Grounding Conductors

3 Contactor W1

Select size and length using Section 3-10. Connect as shown in illustration.

For Models With Optional Ground Current Sensor:

4 Ground Current Sensor

When cutting input and ground conductors to length, ground conductor must be 26 inches (660 mm) long to wrap around ground current sensor. Note that ground conductor must be insulated between strain relief and ground terminal.

Insert input and grounding conductors through strain relief. Route grounding conductor through reed switch from right side of unit, under switch, and through reed switch again (two turns total) before connecting to ground terminal.

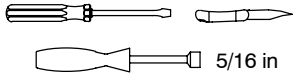
For All Models:

5 Line Disconnect Device

See Section 3-10.

Reinstall right side panel.

Tools Needed:



801 535-B / 801 822-A

SECTION 4 – OPERATION

4-1. Front Panel Controls

1 Power Switch

☞ *The fan motor is thermostatically controlled and only runs when cooling is needed.*

2 Voltmeter (see Section 4-2)

3 Ammeter/Trim Indicator (see Section 4-2)

4 Ammeter Light

Lights when display beneath is indicating amperage.

5 Trim Indicator Light

Lights when display beneath is indicating trim.

6 Output Adjust Control

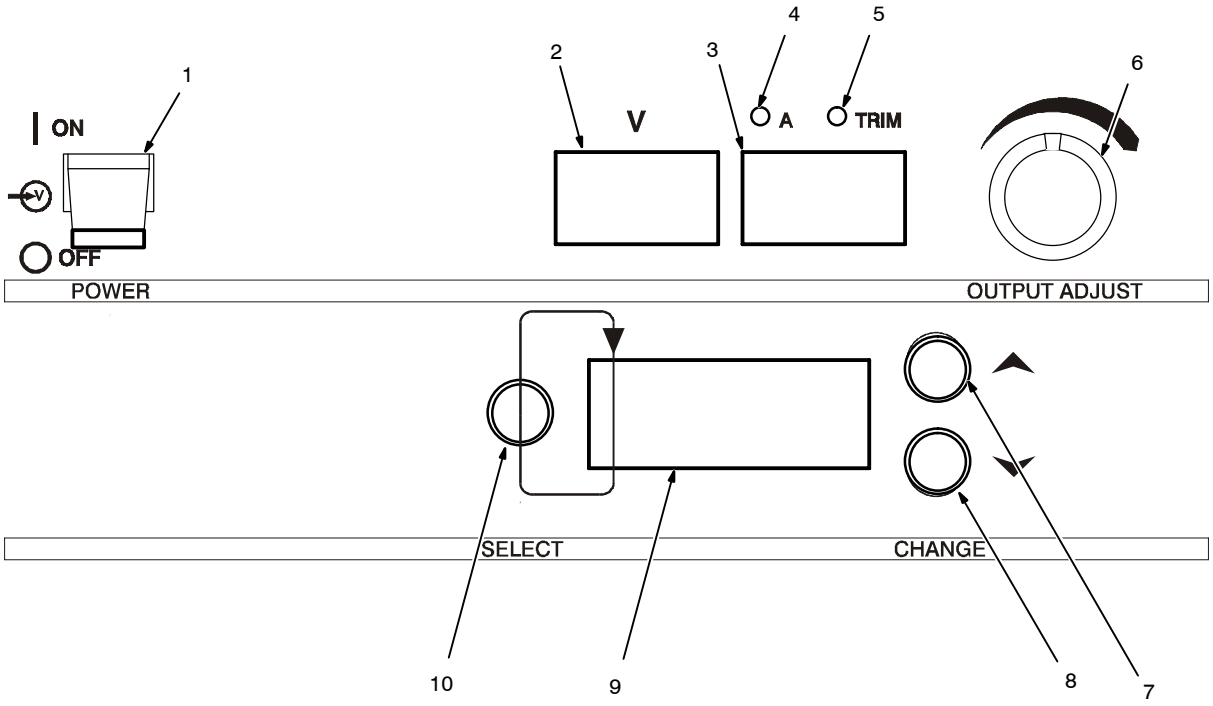
Controls various output values, depending on mode being used.

7 Increment Push Button (see Section 4-4)

8 Decrement Push Button (see Section 4-4)

9 Display (see Section 4-4)

10 Select Push Button (see Section 4-4)



Ref. 192 057

4-2. Meter Functions

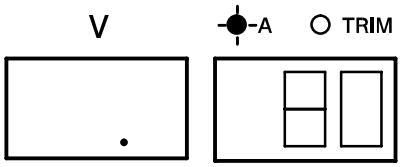
☞ *The meters display the actual weld output values for approximately three seconds after the arc is broken.*

Mode	Meter Reading At Idle		Meter Reading While Welding	
MIG	V **24.5** Preset Volts	A Blank	V **24.5** Actual Volts	A **250** Actual Amps
Pulsed MIG	V Blank	Trim **50** Pulse Display	V **24.5** Actual Volts	A **250** Actual Amps
Stick– Contactor Remote	V Blank	A **85** Preset Amps	V **24.5** Actual Volts	A **85** Actual Amps
Stick– Contactor ON	V **80.0** Actual Volts (OCV)	A **85** Preset Amps	V **24.5** Actual Volts	A **85** Actual Amps
Manual Pulse	V **PPS**	A **200** Pulses Per Second	V **24.5** Actual Volts	A **85** Actual Amps

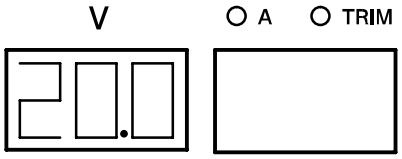
☞ *The Stick mode provides the* Adaptive Hot Start™ *feature, which automatically increases the output amperage at the start of a weld should the start require it. This eliminates electrode sticking at arc start.*

4-3. Example Displays

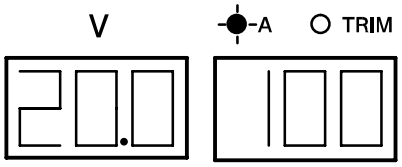
☞ *Values shown are hypothetical.*
The "A" (Amperage) and "Trim" lights illuminate as shown.



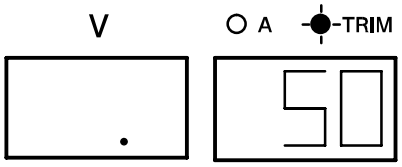
Amperage preset display for Stick welding mode.



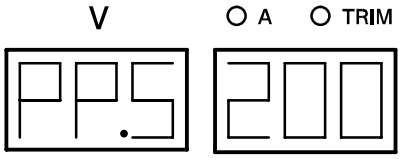
Voltage preset display for MIG welding mode.



Display while welding.

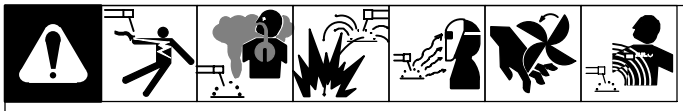


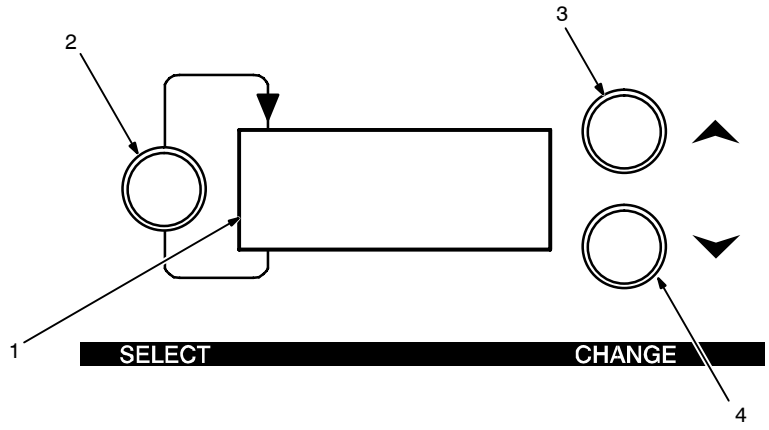
Preset trim display for Pulse welding mode.



Preset pulses per second (PPS) display for Manual Pulse welding mode.

4-4. Synergic Controls and Overview





Controls

1 Display

2 Parameter Select Push Button

Press button to move > on display. The parameter indicated by > is selected.

3 Increment Push Button

Press increment button to increase selected parameter.

4 Decrement Push Button

Press decrement button to decrease selected parameter.

See example at left.

Overview

The built-in synergic control provides four modes of operation:

Manual Pulse MIG – control functions as a discrete pulsed MIG CC control.

Mig – control functions as a remote voltage control.

Stick – unit is placed in CC mode for SMAW welding.

Synergic Pulser – programs that use factory-entered values are used to control process.

Setup screens (see Section 4-6) allow programs or modes to be made inaccessible (locked out) to the operator, and the language used in the displays (English, French, etc.) to be defined.

Example

To select Program 7, set to Non Adaptive, and set Arc Length to 36, proceed as follows:

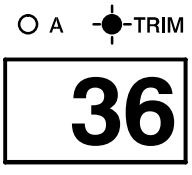
Select top line by pressing Select push button until > is on top line. Press Increment button until Program 7 appears.

```
>Prg 7 035Al 4043 Ar
 Adaptive
```

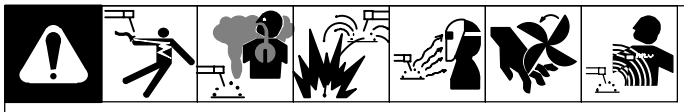
Press Select push button to select second line, and press Increment or Decrement button so Non Adaptive appears.

```
 Prg 7 035Al 4043 Ar
>Non Adaptive
```

Turn Output Adjust control to set arc length to 36.



4-5. Initial Display, Manual Pulse MIG Mode, MIG Mode, and Stick Mode



```
INVISION 456MP
COPYRIGHT (C) 1998
MILLER Electric
Mfg Co XXXXXX
```

1

2

```
>Prg16 Manual Pulse
 346 Amps Peak
  78 Amps Background
 1.73 ms Pulse Width
```

With > on top line, press Increment or Decrement button until Manual Pulse MIG appears.

```
 346 Amps Peak
  78 Amps Background
 1.73 ms Pulse Width
 400 Amps Start
```

Display scrolls to show line 5.

3

```
>Prg17 MIG
  30% Inductance
```

With > on top line, press Increment or Decrement button until MIG appears.

4

```
>Prg18 STICK
 Contactor REMOTE
  25% DIG
```

With > on top line, press Increment or Decrement button until STICK appears.

1 Software Program Number

When power is applied, initial display with software number appears momentarily, and then last program to be viewed before control was shut down appears.

2 Manual Pulse MIG Mode

The synergic control functions as a discrete pulsed MIG CC control in this mode.

Select top line of display, and press Increment or Decrement button until Manual Pulse MIG is displayed.

Select Amps Peak line, and use Increment or Decrement button to set peak amperage from 100–400 amps, but always at least 1 amp more than background amperage.

Select Amps Background line, and use Increment or Decrement button to set background amperage (min: 10 amps; max: 300 amps, but always at least 1 amp less than peak setting).

Select ms Pulse Width line, and use Increment or Decrement button to set pulse width (1 - 5 ms, but max setting may be less depending on Frequency setting).

Select Amps Start line, and use Increment or Decrement button to set starting amperage (150 - 530 amperes). This amperage value is used at the start of the weld or when an arc is restarted.

Use Output Adjust control to set pulse frequency. The range is 30 - 300 pulses per second, but max setting may be less depending on Pulse Width setting.

3 MIG Mode

The synergic control provides voltage control.

Select top line of display, and press Increment or Decrement button until MIG is displayed. Select Inductance line, and use Increment or Decrement button to set inductance (0–100% in increments of one). Use Output Adjust control to set voltage value (10–35 volts).

4 Stick Mode

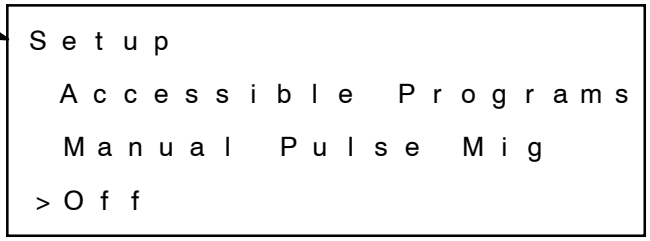
In the Stick mode, the user can select contactor control (remote or On) and the Dig value.

Select contactor control line and press Increment or Decrement button to select Remote contactor control or On. The contactor is On at all times when On is selected.

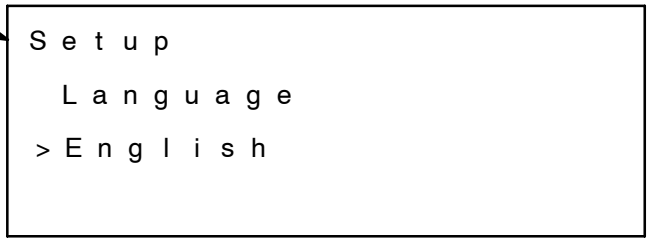
Select Dig line, and and use Increment or Decrement button to set Dig value (min: 0%; max: 100%). Dig helps arc starting and reduces sticking while welding. The higher the dig value defined, the more the short-circuit amperage increases at low arc voltage.

4-6. Setup Screens

1



2



To access Setup screens: turn welding power source Off, press and hold Select push button, turn unit On, and hold push button down until initial screen leaves.

To exit Setup screens, turn welding power source Off and then On again. Parameters that are displayed when the Setup screens are exited are active.

1 Accessible Programs Screen

Select second line of display, and press Increment or Decrement button until Accessible Programs is displayed.

Select third line of display and press Increment or Decrement button to access each program and the three modes as desired. Select the fourth line and press Increment or Decrement button to define each option On (accessible) or Off (not accessible).

Programs and modes that are defined Off are not shown when the operator scrolls through the displays in normal operation.

2 Language Screen

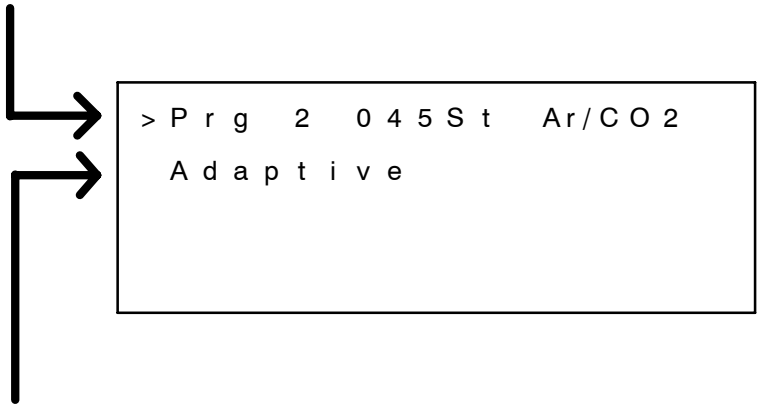
Select second line of display, and press Increment or Decrement button until Language is displayed. Select third line of display and press Increment or Decrement button until desired language is shown. The choices are English, French, Italian, Spanish, and German.

4-7. Choosing Pulse Programs and Setting Parameters

Choosing Pulse Program:

Pulse programs are pre-written and cannot be changed by the user. See Section 5 for program parameters and recommended gas mixtures.

Choose program depending on the type and size of wire, and type of shielding gas used. For example, the program shown below is for .045 steel wire using Ar – CO_2 gas.



Choosing Adaptive Or Non Adaptive:

Adaptive: Pulse frequency is automatically regulated to maintain a constant arc length, regardless of changes in wire stickout.

Non Adaptive: Constant pulse frequency is maintained, regardless of the arc length.

Choose mode which best applies to your application.

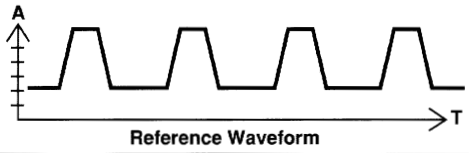
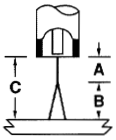
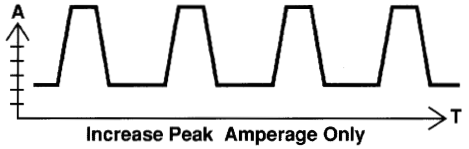
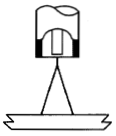
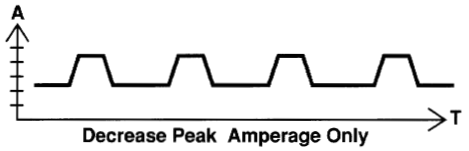
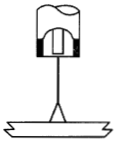
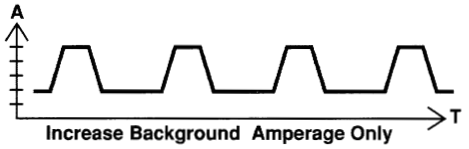
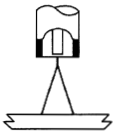
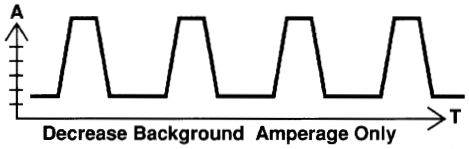
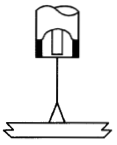
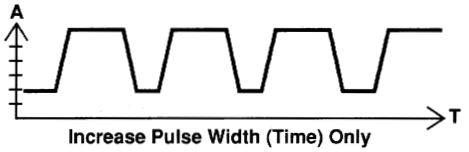
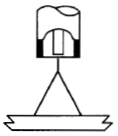
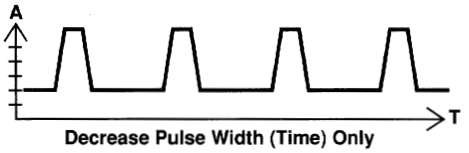
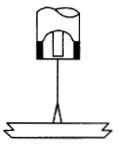
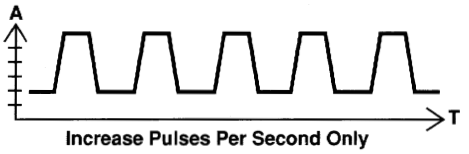
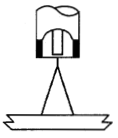
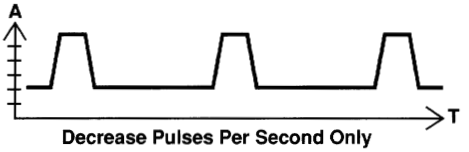
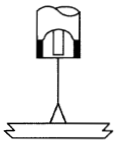
Setting Arc Length:

Arc length is adjusted with the Output Adjust control. Displayed preset Trim values (0 – 100) are for reference only.

Adjustment normally needed if wire feed speed or type of weld joint is changed.

Set arc length that best applies to your application.

4-8. How Manual Pulsed MIG Waveform Components Affect Arc and Burn-Off Rate

	CHANGES TO ARC	COMMENTS
 Reference Waveform		**A** Electrode extension (stickout) **B** Arc length **C** Contact tube-to-work distance should be 3/8 in. to 3/4 in. Recommended gun angle is 10° to 20° from vertical.
 Increase Peak Amperage Only		Increasing peak amperage only: Increases burn-off rate, which directly affects arc length Increases average amperage slightly Increases heat input slightly ***Note: A good fine tuning parameter for arc length.*** ***Assuming a constant pulse width (peak time), peak amperage should be high enough to achieve a spray transfer. Too low of a peak current often results in a globular transfer.*** ***High peak amperages result in smaller droplets, and a more forceful or driving arc.***
 Decrease Peak Amperage Only		
 Increase Background Amperage Only		Increasing background amperage only: Increases arc length Increases average amperage Increases heat input and penetration Increases puddle fluidity ***Note: This current level is largely responsible for arc stabilization, and must be high enough to maintain the arc between peak current pulses.***
 Decrease Background Amperage Only		
 Increase Pulse Width (Time) Only		Increasing pulse width (time) only: Increases arc length Increases heat input and penetration Increases arc cone width Increases average amperage
 Decrease Pulse Width (Time) Only		
 Increase Pulses Per Second Only		Increasing pulses per second only: Increases arc length Increases average amperage Increases heat input ***Note: A good fine tuning parameter for arc length.*** ***Typically, this variable is adjusted to control the Burn-off rate of the wire as it is fed into the arc.***
 Decrease Pulses Per Second Only		

SECTION 5 – PROGRAMS

☞ *Section 5-1 provides basic information on each of the fifteen programs in the unit's memory. See Section 5-2 for more detailed information on each of the programs.*

☞ *Synergic Information: The manufacturer makes no warranties, express or implied, that welds made using the synergic parameters of this equipment will meet the requirements of the application.*

The synergic parameters contained in this equipment are intended only to be a general guideline. The choice and use of any synergic setting must be tested as to its suitability for the application.

5-1. Overview of Programs

Program #	Wire Type	Wire Size	Shielding Gas	IPM: Min	IPM: Max
1	Steel	.035 in	Ar/CO_2	80	750
2	Steel	.045 in	Ar/CO_2	80	750
3	Steel	.052 in	Ar/CO_2	70	750
4	Steel	.062 in	Ar/CO_2	60	400
5	Stainless	.035 in	$98Ar/2CO_2$	100	750
6	Stainless	.045 in	$98Ar/2CO_2$	90	750
7	4043AL	.035 in	Argon	240	840
8	4043AL	.047 in	Argon	150	750
9	4043AL	.062 in	Argon	120	520
10	5356AL	.035 in	Argon	350	850
11	5356AL	.047 in	Argon	200	750
12	5356AL	.062 in	Argon	180	580
13	Nickel	.035 in	75Ar/25He	120	670
14	Nickel	.045 in	75Ar/25He	100	600
15	Silicon Bronze	.035 in	Argon	120	750
16	Metal Core	.045 in	Ar/CO_2	100	750
17	Metal Core	.052 in	Ar/CO_2	50	750
18	Metal Core	.062 in	Ar/CO_2	50	500

5-2. Programs

Program 1 –– .035 ER70S–3 Mild Steel –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 10% CO_2; Argon/O_2 mixes up to 5% O_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
80	0	291	37	33	1.48	292
147	10	315	65	59	1.62	314
214	20	345	82	85	1.75	345
281	30	385	96	100	1.87	384
348	40	421	101	110	1.95	420
415	50	442	110	120	1.98	441
482	60	458	120	130	2.10	458
549	70	472	124	140	2.20	472
616	80	487	129	150	2.26	487
683	90	501	134	160	2.32	501
750	100	510	138	165	2.37	511

Program 2 –– .045 ER70S–3 Mild Steel –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 10% CO_2; Argon/O_2 mixes up to 5% O_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
80	0	381	37	50	2.00	550
147	10	404	56	80	2.20	600
214	20	435	70	110	2.35	652
281	30	461	84	130	2.50	698
348	40	487	91	145	2.70	698
415	50	498	98	155	2.80	698
482	60	512	105	165	2.90	698
549	70	522	110	175	3.00	698
616	80	534	115	185	3.10	698
683	90	545	120	195	3.20	698
750	100	555	124	205	3.30	698

Program 3 –– .052 ER70S–3 Mild Steel –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 10% CO_2; Argon/O_2 mixes up to 5% O_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
70	0	369	44	57	2.30	600
138	10	449	68	94	2.43	600
206	20	484	89	125	2.58	624
274	30	512	117	150	2.70	652
342	40	538	138	170	2.80	674
410	50	562	162	191	2.90	698
478	60	574	174	212	3.00	727
546	70	585	185	235	3.10	755
614	80	595	195	248	3.15	780
682	90	600	200	253	3.18	801
750	100	600	204	256	3.20	801

Program 4 –– .062 ER70S–3 Mild Steel –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 10% CO_2; Argon/O_2 mixes up to 5% O_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
60	0	458	51	60	2.42	674
94	10	489	82	81	2.62	688
128	20	512	110	102	2.80	702
162	30	527	134	120	2.92	716
196	40	541	155	138	3.04	730
230	50	557	176	156	3.17	748
264	60	569	197	174	3.30	762
298	70	581	218	192	3.43	776
332	80	590	240	210	3.56	790
366	90	600	251	220	3.62	801
400	100	600	261	228	3.68	801

Program 5 –– .035 309L Stainless Steel –– Recommended Gases: 98 Argon/2 CO_2 Alternative Gases: Argon/CO_2 mixes up to 10% CO_2; Argon/O_2 mixes up to 5% O_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
100	0	272	40	44	1.52	402
165	10	298	49	77	1.67	420
230	20	310	72	88	1.79	441
295	30	322	96	100	1.91	458
360	40	334	108	112	2.03	480
425	50	348	115	125	2.14	494
490	60	362	122	138	2.22	501
555	70	374	129	151	2.29	508
620	80	388	136	164	2.35	515
685	90	400	143	177	2.40	522
750	100	411	150	190	2.45	529

Program 6 –– .045 309L Stainless Steel –– Recommended Gases: 98 Argon/2 CO_2 Alternative Gases: Argon/CO_2 mixes up to 10% CO_2; Argon/O_2 mixes up to 5% O_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
90	0	320	47	60	1.50	441
156	10	345	70	90	1.65	472
222	20	371	89	120	1.75	511
288	30	402	103	145	1.85	550
354	40	430	117	155	1.97	589
420	50	454	129	165	2.09	631
486	60	470	138	175	2.20	663
552	70	484	145	185	2.30	695
618	80	498	152	195	2.40	727
684	90	512	157	210	2.50	762
750	100	527	162	225	2.60	801

Program 7 –– .035 Aluminum 4043 –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
240	0	157	42	35	2.05	402
300	10	160	61	40	2.10	451
360	20	181	80	60	2.17	451
420	30	218	101	75	2.30	451
480	40	244	112	90	2.40	501
540	50	256	120	104	2.50	501
600	60	268	131	117	2.60	501
660	70	280	141	127	2.70	550
720	80	291	152	138	2.80	550
780	90	301	162	148	2.90	550
840	100	312	174	158	3.00	550

Program 8 –– .047 Aluminum 4043 –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
150	0	200	40	54	2.00	501
210	10	218	68	80	2.16	600
270	20	270	82	96	2.42	600
330	30	320	94	110	2.55	600
390	40	360	112	120	2.68	600
450	50	385	127	131	2.81	652
510	60	407	138	141	2.92	652
570	70	428	148	151	3.02	702
630	80	451	160	160	3.12	702
690	90	470	171	170	3.26	751
750	100	491	181	180	3.38	751

Program 9 –– 1/16 .062 Aluminum 4043 –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
120	0	258	56	40	2.15	550
160	10	270	89	60	2.40	649
200	20	298	115	80	2.60	649
240	30	336	134	106	2.89	702
280	40	367	148	122	3.15	720
320	50	400	157	134	3.35	737
360	60	421	169	144	3.55	748
400	70	440	181	154	3.70	758
440	80	461	192	164	3.90	772
480	90	480	204	174	4.05	787
520	100	498	216	180	4.18	801

Program 10 –– .035 Aluminum 5356 –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
350	0	200	65	54	1.90	451
400	10	216	72	66	1.95	451
450	20	230	80	78	2.00	451
500	30	242	87	88	2.05	501
550	40	251	94	96	2.10	501
600	50	261	101	104	2.17	501
650	60	272	108	112	2.24	501
700	70	284	117	121	2.32	501
750	80	296	127	130	2.40	550
800	90	301	131	137	2.45	550
850	100	303	134	140	2.48	550

Program 11 –– .047 Aluminum 5356 –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
200	0	240	47	55	2.10	501
255	10	270	58	80	2.20	600
310	20	301	65	98	2.30	600
365	30	320	72	110	2.40	652
420	40	341	80	120	2.50	652
475	50	350	91	130	2.60	652
530	60	388	101	140	2.70	652
585	70	411	110	153	2.80	702
640	80	421	120	163	2.90	702
695	90	440	131	168	2.95	702
750	100	461	141	170	3.00	702

Program 12 –– .062 Aluminum 5356 –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
180	0	291	82	50	2.25	652
220	10	312	98	62	2.38	663
260	20	338	120	77	2.55	705
300	30	362	136	90	2.69	723
340	40	383	148	100	2.80	748
380	50	404	160	110	2.91	772
420	60	428	176	122	3.04	783
460	70	451	192	134	3.19	794
500	80	484	207	146	3.34	801
540	90	501	216	156	3.42	801
580	100	517	225	165	3.50	801

Program 13 –– .035 Nickel –– 75 Argon/25 Helium						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
120	0	254	37	40	2.85	501
175	10	287	49	54	2.96	501
230	20	312	61	68	3.08	511
285	30	331	72	77	3.20	522
340	40	348	84	89	3.32	532
395	50	360	91	99	3.40	543
450	60	374	98	108	3.48	554
505	70	390	105	117	3.55	564
560	80	404	112	126	3.62	575
615	90	418	120	135	3.69	585
670	100	432	127	144	3.76	596

Program 14 –– .045 Nickel –– 75 Argon/25 Helium						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
100	0	289	56	56	3.00	600
150	10	315	75	76	3.22	600
200	20	345	89	100	3.34	600
250	30	364	103	116	3.50	628
300	40	385	117	129	3.62	645
350	50	404	134	142	3.72	660
400	60	423	150	155	3.82	670
450	70	440	164	168	3.92	677
500	80	458	176	180	4.02	688
550	90	475	188	192	4.12	702
600	100	491	197	204	4.20	712

Program 15 –– .035 Silicon Bronze –– Argon						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
120	0	280	37	42	1.30	501
183	10	331	54	57	1.40	540
246	20	371	68	72	1.50	582
309	30	402	77	93	1.60	610
372	40	421	87	108	1.70	642
435	50	442	96	119	1.80	663
498	60	463	108	130	1.90	684
561	70	482	115	140	2.00	705
624	80	496	122	150	2.10	720
687	90	508	127	160	2.20	730
750	100	520	131	170	2.30	737

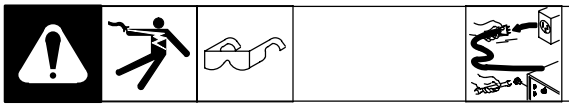
Program 16 –– .045 Metal Core –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 20% CO_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
100	0	376	42	60	1.70	476
165	10	409	51	95	1.80	511
230	20	440	65	115	1.90	540
295	30	465	75	140	1.95	568
360	40	480	82	155	2.00	582
425	50	496	89	170	2.10	596
490	60	512	96	185	2.20	614
555	70	527	101	195	2.25	628
620	80	543	105	205	2.30	645
685	90	560	112	217	2.40	660
750	100	576	120	230	2.50	677

Program 17 –– .052 Metal Core –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 20% CO_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
50	0	360	30	35	1.90	600
120	10	421	54	75	2.00	649
190	20	461	72	105	2.10	698
260	30	491	91	125	2.25	751
330	40	512	105	145	2.40	800
400	50	531	120	165	2.50	800
470	60	545	127	180	2.60	800
540	70	564	138	190	2.70	800
610	80	576	143	202	2.80	800
680	90	588	148	214	2.90	800
750	100	600	150	225	3.00	800

Program 18 –– .062 Metal Core –– Recommended Gases: Argon/CO_2 Gases: Argon/CO_2 mixes up to 20% CO_2						
IPM	**Trim**	**Peak Amp**	**Background Amp**	**Freq.**	**Pulse Width**	**Starting Amps**
50	0	451	37	38	2.10	674
95	10	498	70	68	2.30	705
140	20	515	91	90	2.40	741
185	30	527	120	112	2.50	772
230	40	541	150	132	2.60	800
275	50	552	171	150	2.75	800
320	60	562	190	168	2.90	800
365	70	571	209	185	3.05	800
410	80	581	225	202	3.20	800
455	90	590	244	220	3.35	800
500	100	600	261	238	3.50	800

SECTION 6 – MAINTENANCE AND TROUBLESHOOTING

6-1. Routine Maintenance

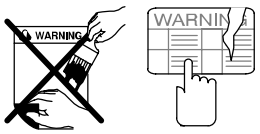


Disconnect power before maintaining.

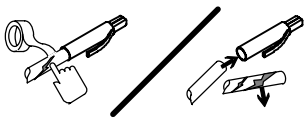
☞ *Maintain more often during severe conditions.*

3 Months

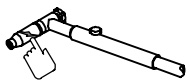
Replace damaged or unreadable label.



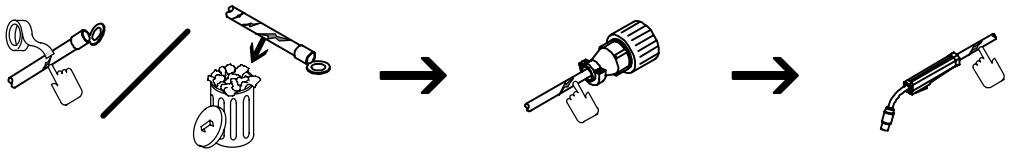
Repair or replace cracked cables.



Replace cracked torch body.

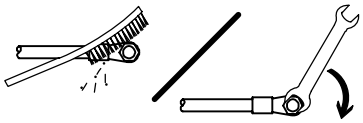


Repair or replace cracked cables and cords.

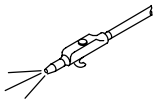


6 Months

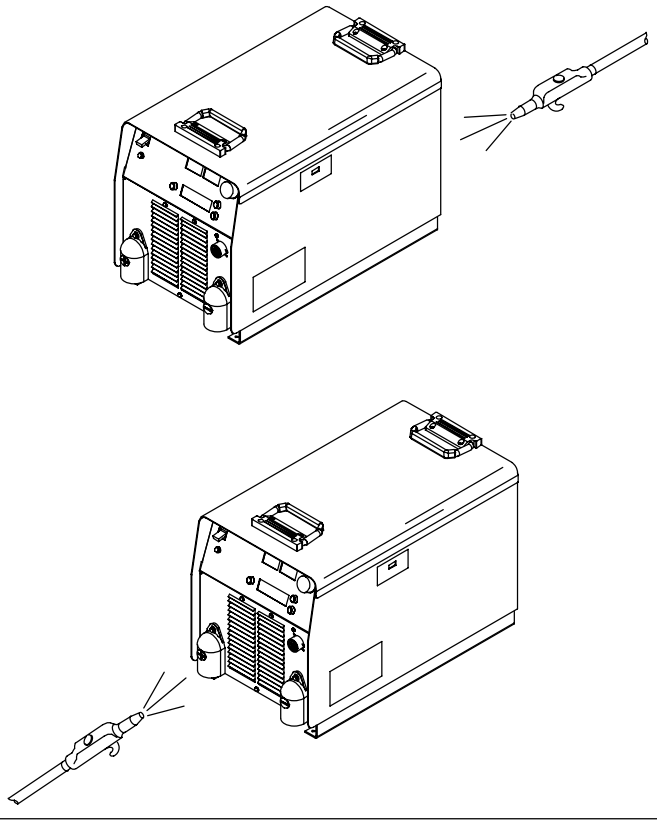
Clean and tighten weld terminals.



Blow out inside.



6-2. Blowing Out Inside of Unit



Do not remove case when blowing out inside of unit.

To blow out unit, direct airflow through front and back louvers as shown.

802 314

6-3. Removing Right Side Panel and Measuring Input Capacitor Voltage in 230/460 Volt Models

Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.

Turn Off welding power source, and disconnect input power.

1 Right Side Panel

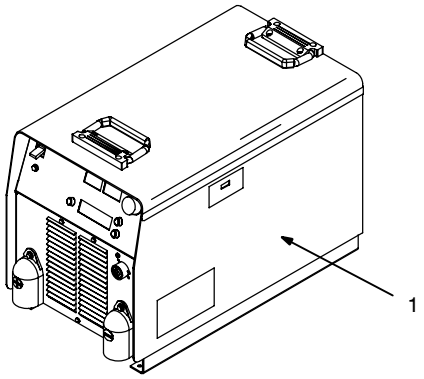
To remove panel, remove screws securing panel to unit.

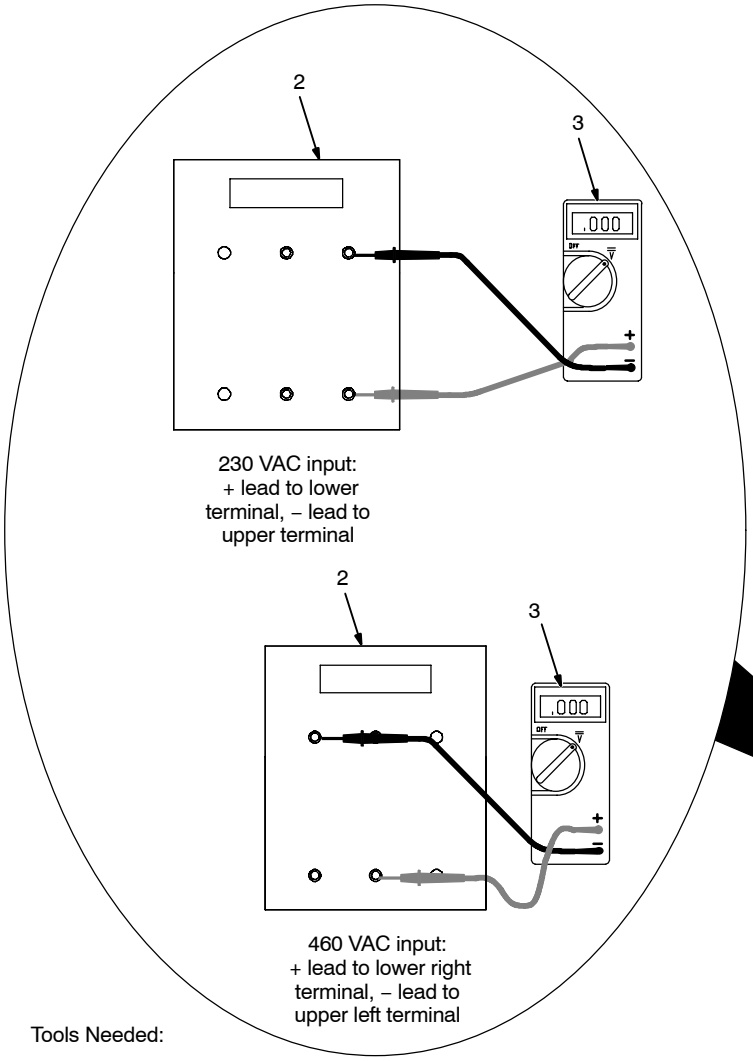
2 Relinking Board PC6

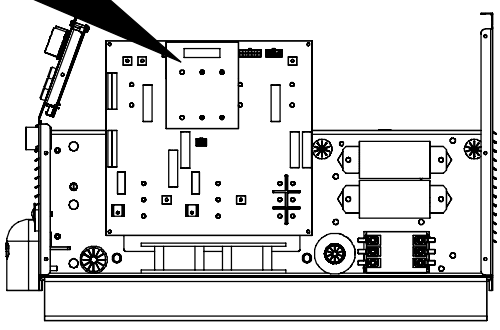
3 Voltmeter

Measure the dc voltage across the screw terminals on PC6 as shown until voltage drops to near 0 (zero) volts.

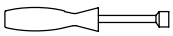
Proceed with job inside unit. Reinstall right side panel when finished.







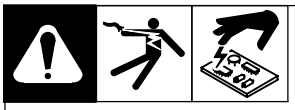
Tools Needed:



5/16 in

802 314 / Ref. 802 315

6-4. Removing Right Side Panel and Measuring Input Capacitor Voltage in 575 Volt Models



Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.

Turn Off welding power source, and disconnect input power.

1 Right Side Panel

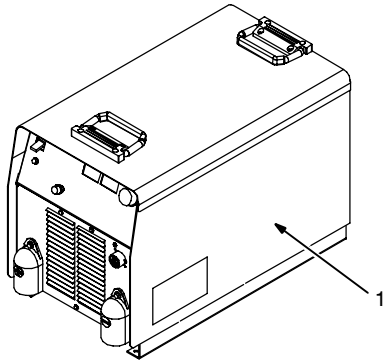
To remove panel, remove screws securing panel to unit.

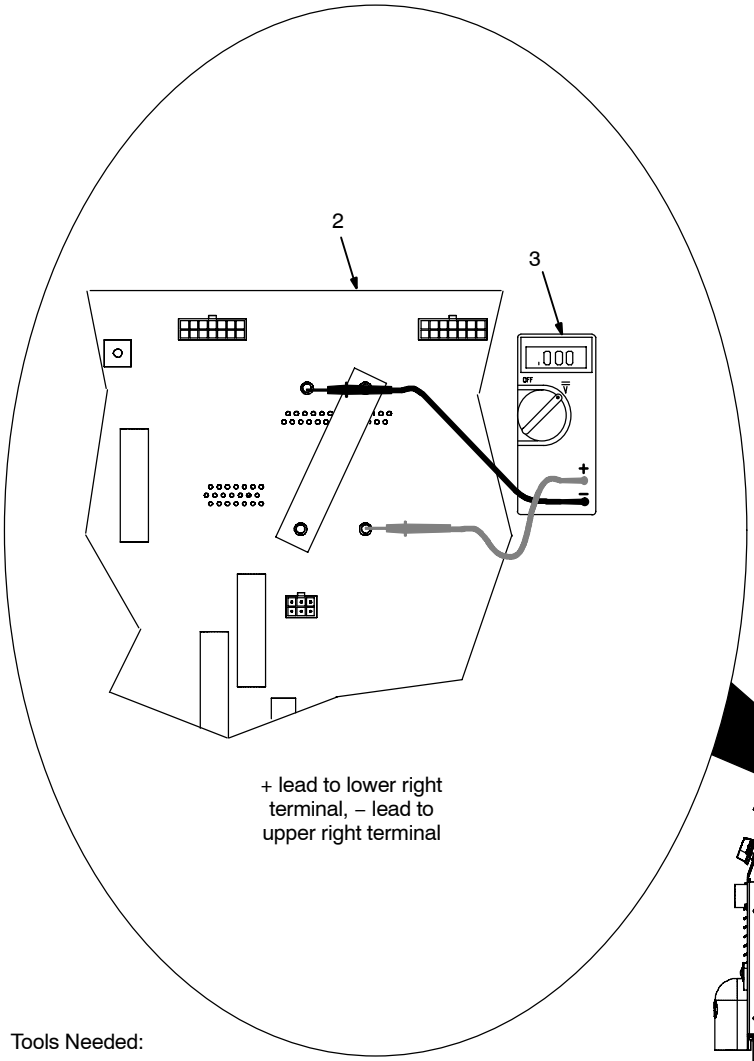
2 Interconnect Board PC2

3 Voltmeter

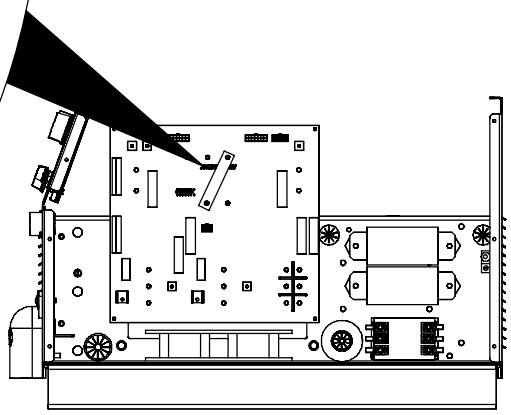
Measure the dc voltage across the screw terminals on PC2 as shown until voltage drops to near 0 (zero) volts.

Proceed with job inside unit. Reinstall right side panel when finished.

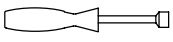




+ lead to lower right terminal, – lead to upper right terminal



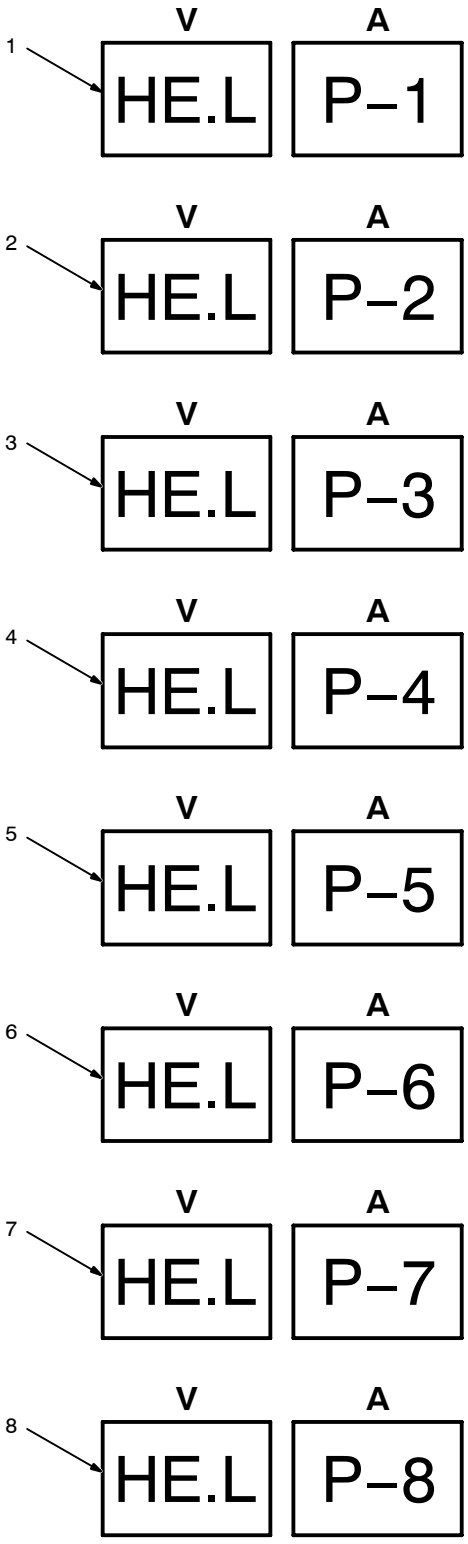
Tools Needed:



5/16 in

Ref. ST-801 718 / Ref. ST-801 536-A

6-5. Voltmeter/Ammeter Help Displays



☞ *All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.*

1 Help 1 Display

Indicates a malfunction in the primary power circuit. If this display is shown, contact a Factory Authorized Service Agent.

2 Help 2 Display

Indicates a malfunction in the thermal protection circuitry located on the left side of the unit. If this display is shown, contact a Factory Authorized Service Agent.

3 Help 3 Display

Indicates the left side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 3-2). Operation will continue when the unit has cooled.

4 Help 4 Display

Indicates a malfunction in the thermal protection circuitry located on the right side of the unit. If this display is shown, contact a Factory Authorized Service Agent.

5 Help 5 Display

Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 3-2). Operation will continue when the unit has cooled.

6 Help 6 Display

Indicates that the input voltage is too low and the unit has automatically shut down. Operation will continue when the voltage is within ±15% of the operating range. If this display is shown, have an electrician check the input voltage.

7 Help 7 Display

Indicates that the input voltage is too high and the unit has automatically shut down. Operation will continue when the voltage is within ±15% of the operating range. If this display is shown, have an electrician check the input voltage.

8 Help 8 Display

Indicates a malfunction in the secondary power circuit of the unit. If this display is shown, contact a Factory Authorized Service Agent. In addition, when the optional ground current sensor is installed, this display indicates weld current in the ground conductor. When this occurs, have an electrician check the primary and secondary connections.

6-6. Error Codes

1 Program CRC Error

2 Program Range Error

If either error code appears, reset the display to factory settings as follows:

Press Parameter Select push button or turn welding power source Off and back On. Change settings and continue.

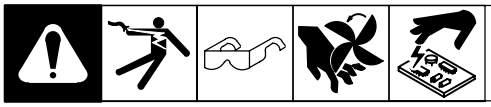
1

```
ERROR
Program CRC
Memory Will Be Reset
Press Parm. Select
```

2

```
ERROR
Program Range
Memory Will Be Reset
Press Parm. Select
```

6-7. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 3-12).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 3-12).
	Check for proper input power connections (see Section 3-12).
No weld output; meter display On.	Check, repair, or replace remote control.
	Unit overheated. Allow unit to cool with fan On (see Section 3-2).
	Check voltmeter/ammeter Help displays.
Erratic or improper weld output.	Check to make sure correct program is select3ed for welding wire and shielding gas used.
	Use proper size and type of weld cable (see Section 3-10).
	Clean and tighten all weld connections.
No 115 volts ac output at duplex receptacle, Remote 14 receptacle.	Reset circuit breaker CB1 (see Section 3-9).
No 24 volts ac output at Remote 14 receptacle.	Reset circuit breaker CB2 (see Section 3-9).

SECTION 7 – ELECTRICAL DIAGRAM

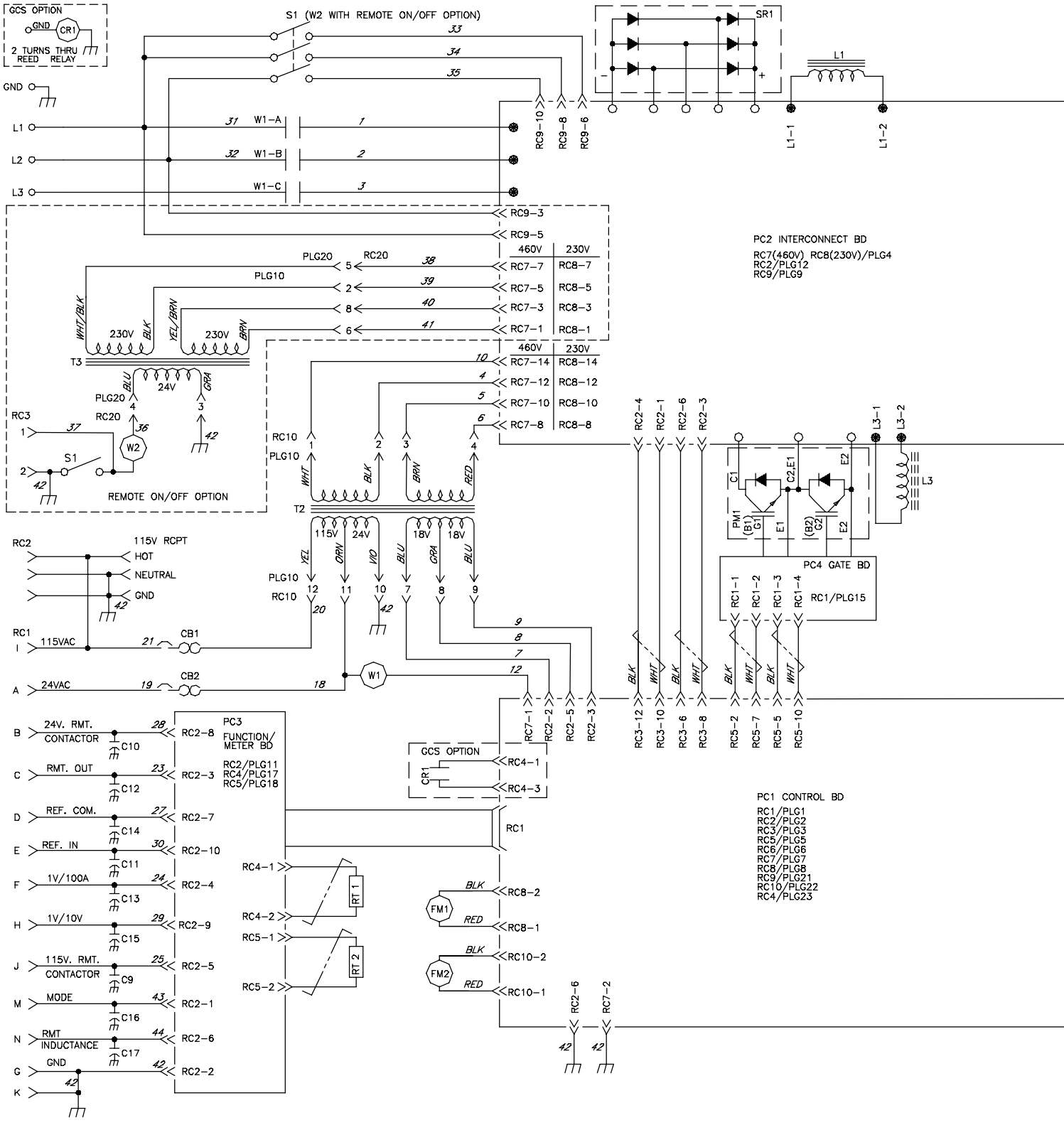
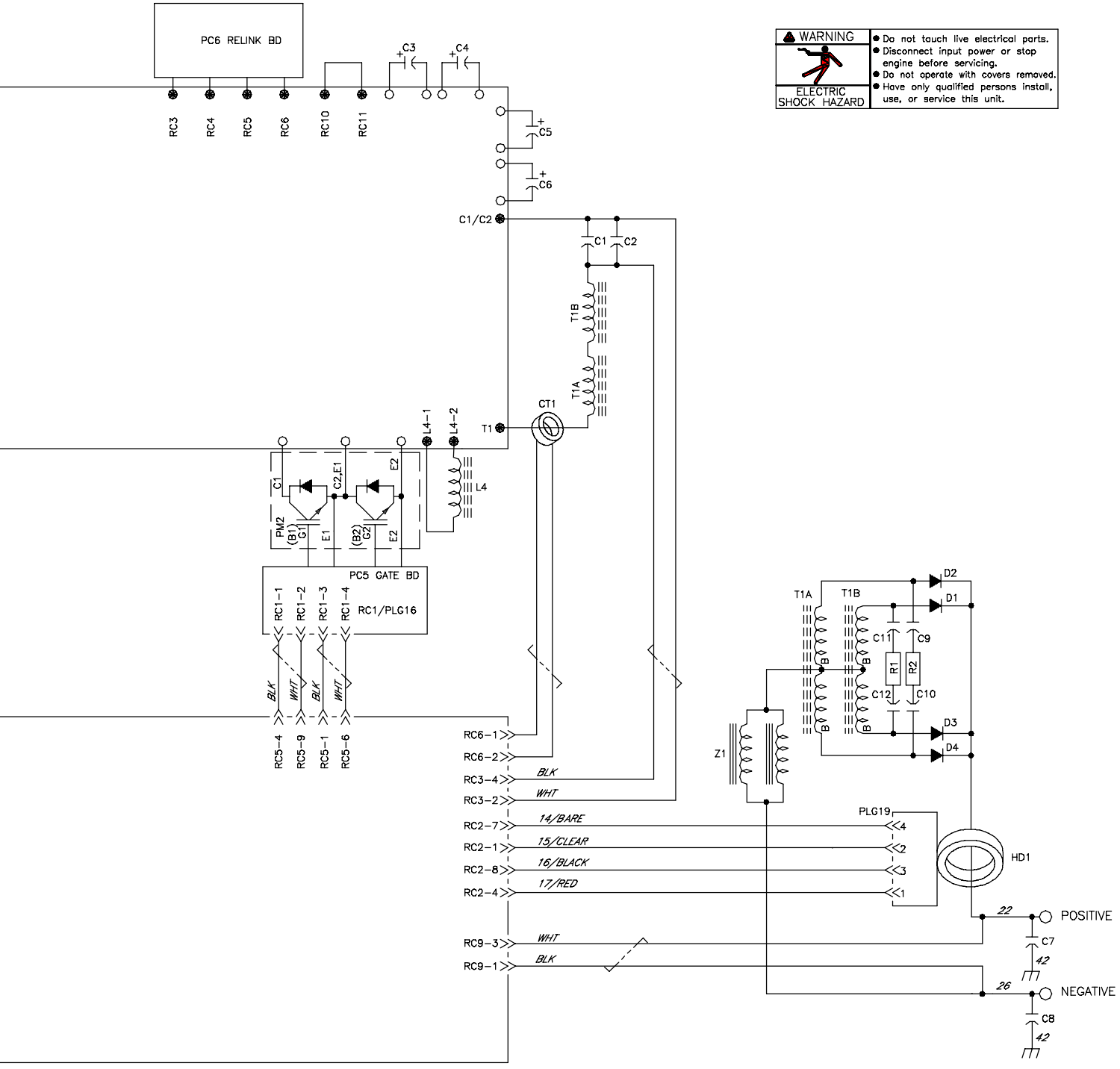


Figure 7-1. Circuit Diagram For Welding Power Source (230/460 Volt Models)


PC6 RELINK BD
RC3
RC4
RC5
RC6
RC10
RC11
C3
C4
C5
C6
C1/C2
C1
C2
T1B
T1A
CT1
T1
L4-1
L4-2
L4
C1
C2,E1
E2
PM2
(B1)
G1
E1
(B2)
G2
E2
PC5 GATE BD
RC1-1
RC1-2
RC1-3
RC1-4
RC1/PLG16
BLK
WHT
BLK
WHT
RC5-4
RC5-9
RC5-1
RC5-6
RC6-1
RC6-2
RC3-4
BLK
RC3-2
WHT
RC2-7
14/BARE
RC2-1
15/CLEAR
RC2-8
16/BLACK
RC2-4
17/RED
RC9-3
WHT
RC9-1
BLK
Z1
T1A
T1B
D2
D1
C11
C9
R1
R2
C12
C10
D3
D4
PLG19
4
2
3
1
HD1
22
POSITIVE
C7
42
26
NEGATIVE
C8
42
WARNING
ELECTRIC SHOCK HAZARD
Do not touch live electrical parts.
Disconnect input power or stop engine before servicing.
Do not operate with covers removed.
Have only qualified persons install, use, or service this unit.

193 264-A

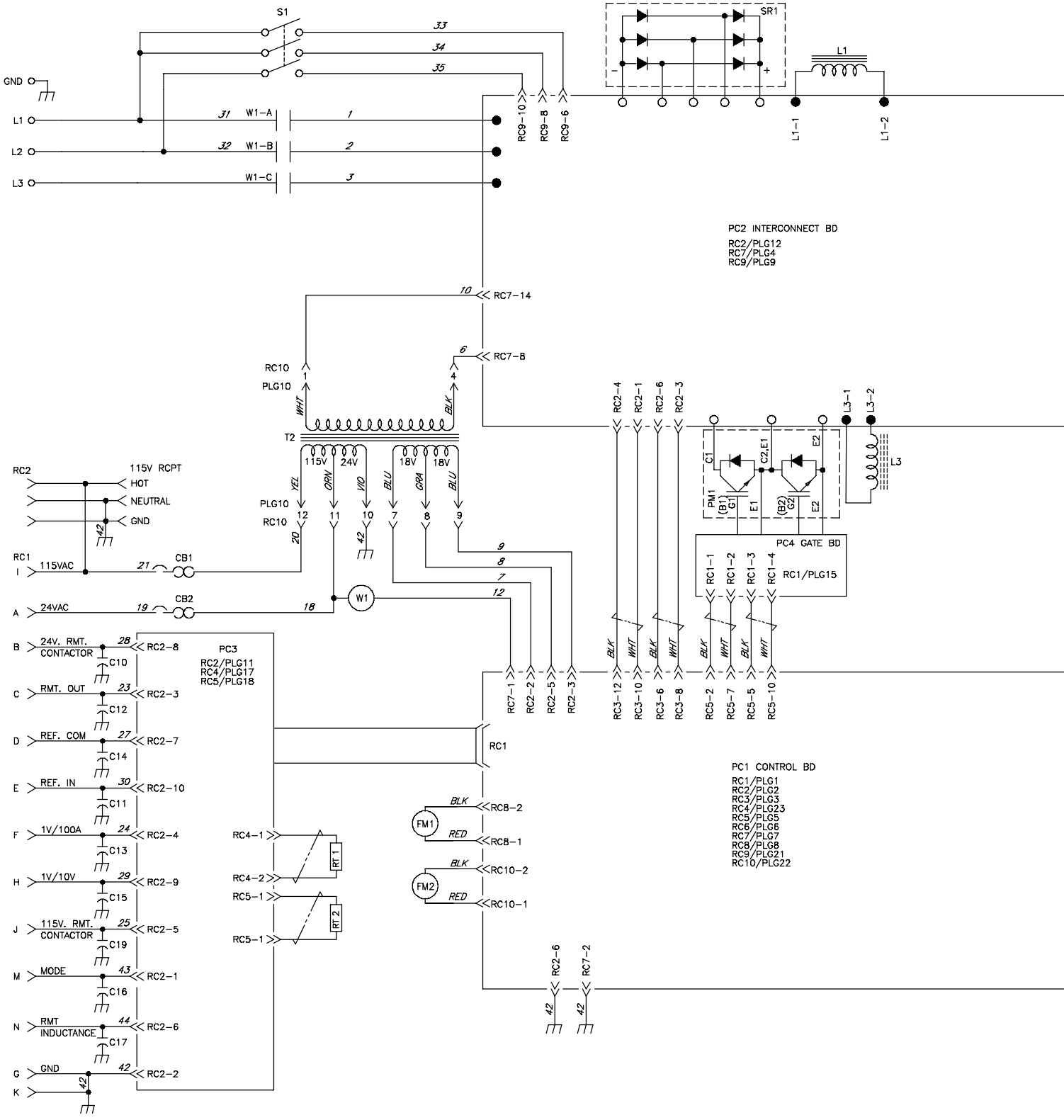
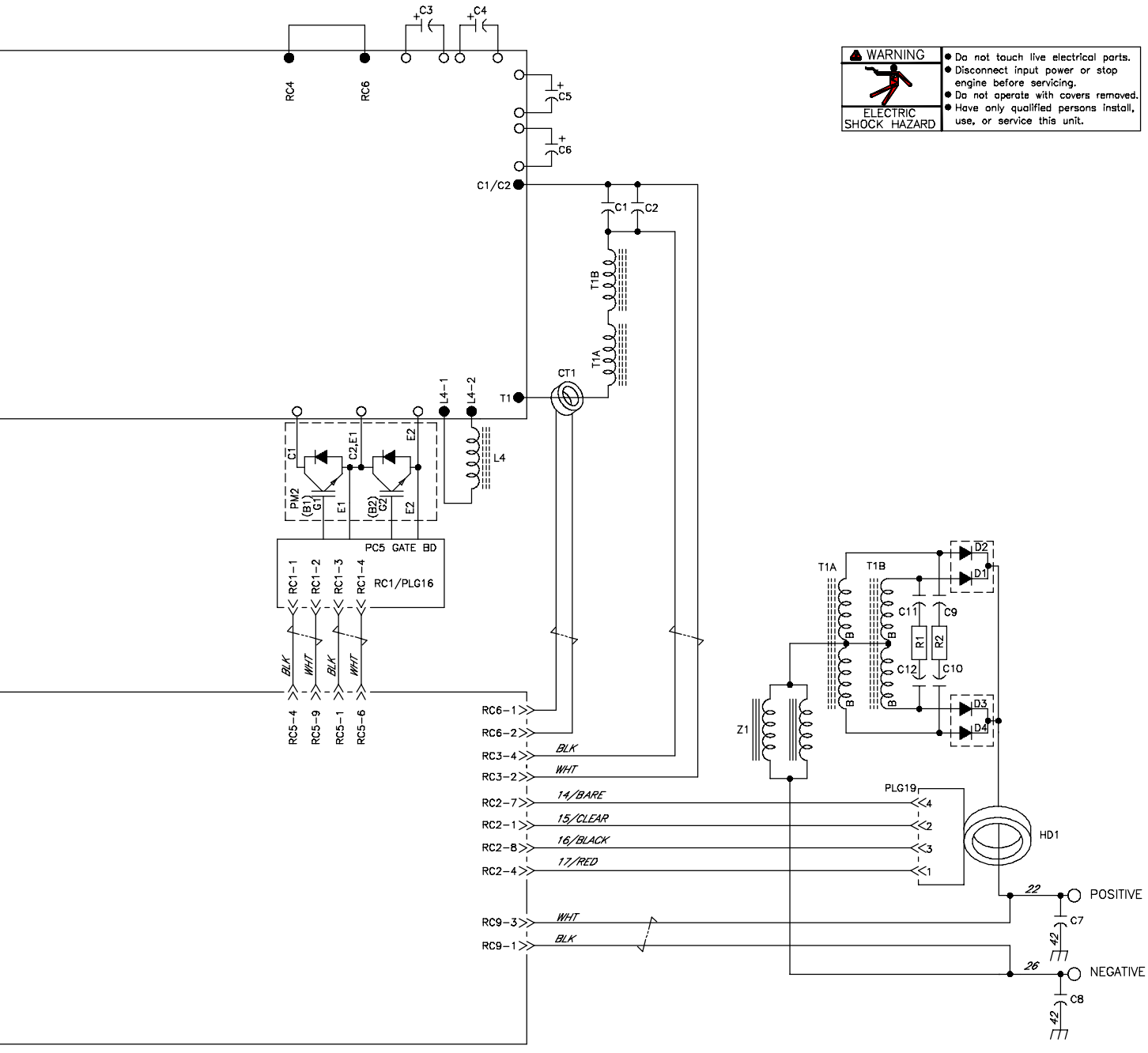


Figure 7-2. Circuit Diagram For Welding Power Source (575 Volt Models)



WARNING

ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

206 318-A

☞ *Hardware is common and not available unless listed.*

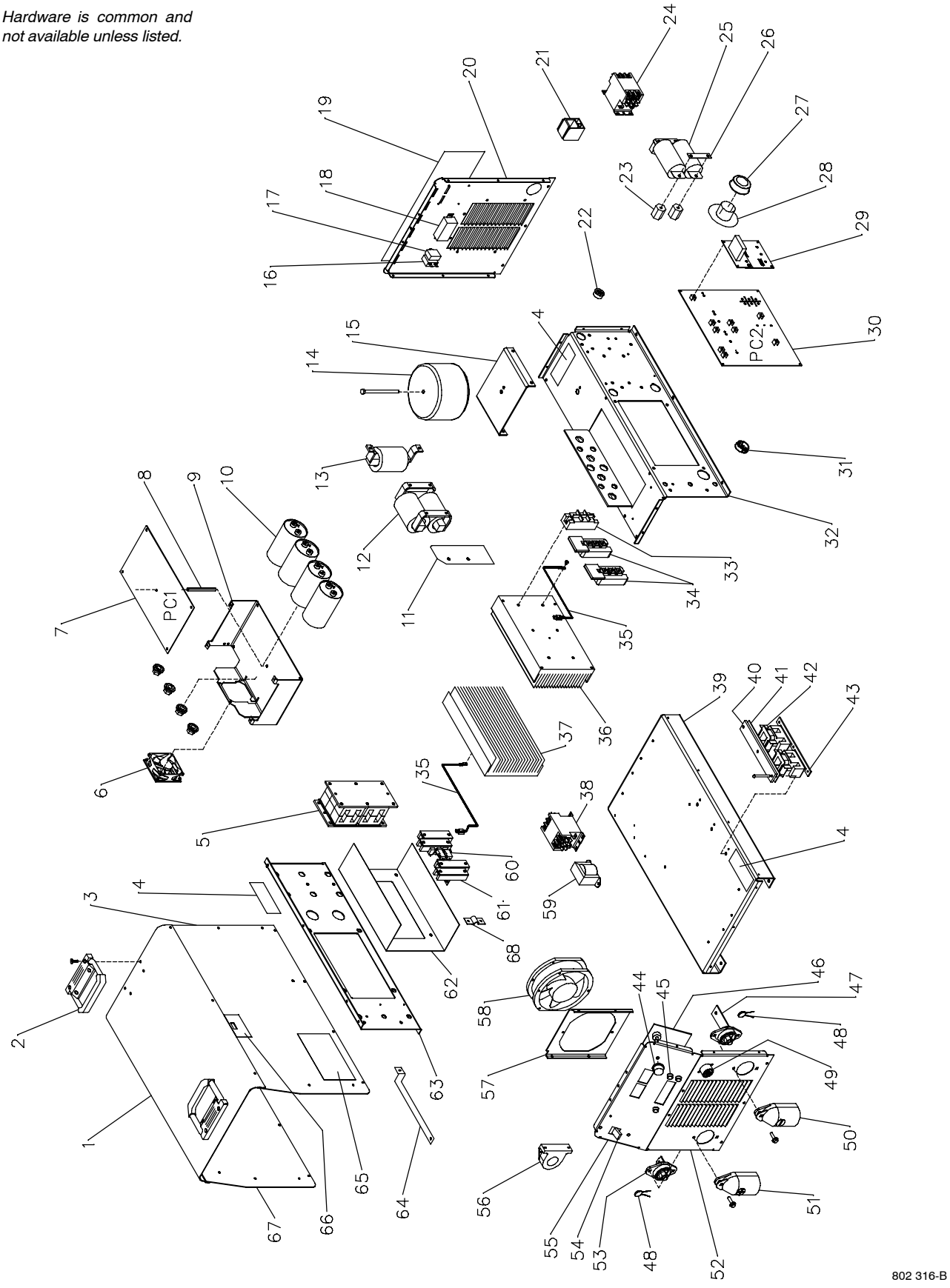


Figure 8-1. Complete Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 8-1. Complete Assembly

1		187 234	Cover, Top	1
2		195 585	Handle	2
3		+190 270	Panel, Side Rh (230/460)	1
3		+ 190 373	Panel, Side Rh (575)	1
		178 551	Insulator, Side	1
4		185 835	Label, Warning Electric Shock	3
5	T1	179 933	Transformer, HF (230/460)	1
5	T1	186 984	Transformer, HF (575)	1
6	FM2	183 918	Motor, Fan 24VDC 3000RPM 43CFM W/10 Ohm Resistor	1
7	PC1	223 865	Circuit Card Assembly, Control (230/460)	1
7	PC1	225 688	Circuit Card Assembly, Control (575)	1
8		194 371	Spacer, Al 3.500 Lg	1
9		194 450	Bracket, Mtg Capacitor/PC Board/Fan	1
10	C3-6	192 935	Capacitor, Elctlt 2700Uf 420 (230/460)	4
10	C3-6	206 757	Kit, Cap Elctlt 575 VAC (Includes)	1
		193 738	Capacitor, Elctlt 1800 Uf 500 VDC Can 2.52 Dia	4
		217 040	Nut, Nylon M12 Thread Capacitor Mounting	4
11		181 925	Insulator, Stabilizer Lead	1
12	Z1	180 029	Stabilizer, Output	1
13	L1	180 026	Inductor, Input	1
14	T2	183 192	Transformer, Control 230/460 VAC	1
14	T2	185232	Transformer, Control 575 VAC	1
15		180 105	Bracket, Mtg Transformer Aux	1
16	CB2	093 995	Circuit Breaker, Man Reset 15A	1
17	CB1	083 432	Circuit Breaker, Man Reset 10A	1
18	RC2	604 176	Receptacle, Str Dx Grd 3W 15A 120V	1
19		179 847	Plate, Identification (Order By Model & Serial Number)	1
		217 297	Cover, Receptacle Weatherproof Duplex Rcpt	1
20		+179 899	Panel, Rear	1
		181 181	Label, Warning Electric Shock	1
21		♦185 373	Switch, Reed (230/460 Only)	1
22		153 403	Bushing, Snap-In Nyl .750 Id X 1.000Mtg Hole	2
23		025 248	Stand-Off, Insul .250−20 X 1.250 Lg	4
24	W1	180 270	Contactor, Def Prp 40A 3P 24VAC	1
25	C1,2	230 272	Capacitor, Polyp Film .34 Uf 1000 VRMS 10% (230/460)	2
25	C1,2	230 270	Capacitor, Polyp Film .22 Uf 1000 VRMS 10% (575)	2
26		185 992	Bus Bar, Capacitor	2
27	CT1	181 271	Transformer, Current 500 Turns	1
28		177 547	Bushing, Snap-In Nyl Ct−Mt 1.125Mtg Hole	1
29	PC6	180 131	Circuit Card Assembly, Relink (230/460 Only)	1
30	PC2	187 243	Circuit Card Assembly, Interconnect (230/460)	1
30	PC2	187 244	Circuit Card Assembly, Interconnect (575)	1
30		185 214	Bus Bar, Interconnecting (575 Only)	1
31		179 276	Bushing, Snap-In Nyl 1.000 X 1.375Mtg Hole	1
32		+194 449	Windtunnel, Rh	1
33	SR1	184 260	Kit, Diode Power Module	1
34	PM1,2	235 309	Kit, Transistor IGBT Module	1
35	RT1,2	173 632	Thermistor, NTC 30K Ohm @ 25Deg C	2
36		179 930	Heat Sink, Power Module	1
37		204 165	Heat Sink, Rect Quad Diode	1
38	W2	♦180 270	Contactor, Def Prp 40A 3P 24VAC (230/460 Only)	1
39		190 272	Base	1
40		180 271	Bracket, Mtg Choke	1
41		182 654	Gasket, Di−Dt Rubber	1
42	L3,4	180 103	Coil, Di−Dt	2
43		176 844	Core, Ferrite	2
44		174 715	Knob, Round 1.250 Dia X .250 Id	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 8-1. Complete Assembly (Continued)

		167 633	Washer, Shldr .612 Id X 1.060 Od X .062 T	1
		010 291	Washer, Flat .625 Id X 1.25 Od X .125 T	1
		159 264	Ring, Rtng Ext .625 Shaft X .042 Thk	1
45		153 169	Actuator, Switch	3
46	PC3	227 553	Circuit Card Assy, Front Panel & Display W/Program	1
47		182 707	Terminal, Power Output Black	1
48	C7,8	222 488	Capacitor Assy,	2
49		190 470	Receptacle, W/Leads-Cap-Plug	1
50		180 732	Boot, Neg Output Stud	1
51		179 848	Boot, Pos Output Stud	1
52		191 760	Panel, Front	1
53		181 245	Terminal, Power Output Red	1
54	S1	128 756	Switch, Tgl 3Pst 40A 600VAC Scr	1
		176 226	Insulator, Switch Power	1
55			Nameplate, (Order By Model And Serial Number)	1
56	HD1	168 829	Transducer, Current 1000A Max	1
57		179 928	Shroud, Fan	1
58	FM1	175 084	Motor, Fan 24VDC 3000RPM	1
59	T3	♦181 042	Transformer (230/460 Only)	1
60	R1,2 C9,10,11,12	232 296	Resistor/Capacitor Assy	2
61	D1-4	201 531	Kit, Diode Ultra Fast Recovery	4
62		179 826	Insulator, Rectifier	1
63		+179 902	Windtunnel, Lh	1
		179 276	Bushing, Snap-In Nyl 1.000 X 1.375Mtg Hole	2
64		183 827	Bus Bar, Output	1
65		134 327	Label, Warning General Precautionary	2
66		222 317	Label, Warning Match Input Power	1
	PLG4	131 056	Housing Receptacle & Sockets	1
	RC10	166 679	Housing Receptacle Pins & Sockets	1
	PLG2	115 092	Housing Plug & Sockets	1
	PLG7,19	115 094	Housing Plug & Sockets	1
	PLG9,11	115 091	Housing Plug & Sockets	1
		♦143 976	Receptacle W/Sockets (230/460 Only)	1
		♦135 409	Housing Plug & Pins (230/460 Only)	1
	PLG3,12	180 776	Plug, W/Leads Voltage Feedback	1
	PLG5,15,16	175 026	Plug, W/Leads	1
	PLG21	211 138	Plug, W/Leads	1
		♦172 565	Cable, Power 21 In 18Ga (230/460 Only)	1
67		190 271	Panel, Side Lh	1
68		199 840	Bus Bar, Diode	4

♦OPTIONAL

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller

TRUE BLUE® WARRANTY

Effective January 1, 2007
(Equipment with a serial number preface of "LH" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Bernard-Branded Mig Guns (No Labor)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches and Subarc (SAW) Guns
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory (Kits)
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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